Telephone: MAYFAIR 6868. Established
Telegraphic Address: WATHOSCOPE, WESDO, LONDON. 1807.

JOHN WE[illegible] LTD.

287, Oxford Street, [illegible] W.1.

Instrument Makers to the Royal London Ophthalmic Hospital (Moorfields)
and to the principal British and Colonial Governments.

CONTRACTORS TO H.M. GOVERNMENT.
Special Orders and Repairs executed with promptitude.

OPERATION & PROJECTION LAMP

(Provl. Patent No. 20703)

As an operation lamp this shows to particularly suitable for ophthalmic work, as an almost red-free light of 40 c.p., without shadows, can be obtained.

For examination of the fundus a filter can be supplied which cuts out all red rays.

The tube is provided with a slotted opening to carry 3" microscopic slides for projection on to a screen. If wider (2") slides are to be used, a special chamber with a spring gate is supplied in which the slide can be held as desired. This, with a slightly different optical system and an iris diaphragm (which serves for operations), gives a magnification of 50 diameters at 10 feet.

A transilluminating cone and slides for testing for colour-blindness can also be supplied.

Prices from £7 10 0. Full particulars on application.

The following pages of Plates are to illustrate the paper on "Some Concussion Changes met with in Military Practice," by Sir William Lister.

PLATE I.—CONCUSSION CHANGES.

Severe concussion changes due to the passage of a missile through the lower and outer side of the orbit. The changes were peripheral and also at the macular region separated by a band of unimpaired retina. Plate I shows condition seen soon after injury with numerous retinal haemorrhages.

PLATE II.

Drawn some weeks later from the same case, showing fibrous tissue development in the retina. Field shows definite separation of the peripheral and central defects.

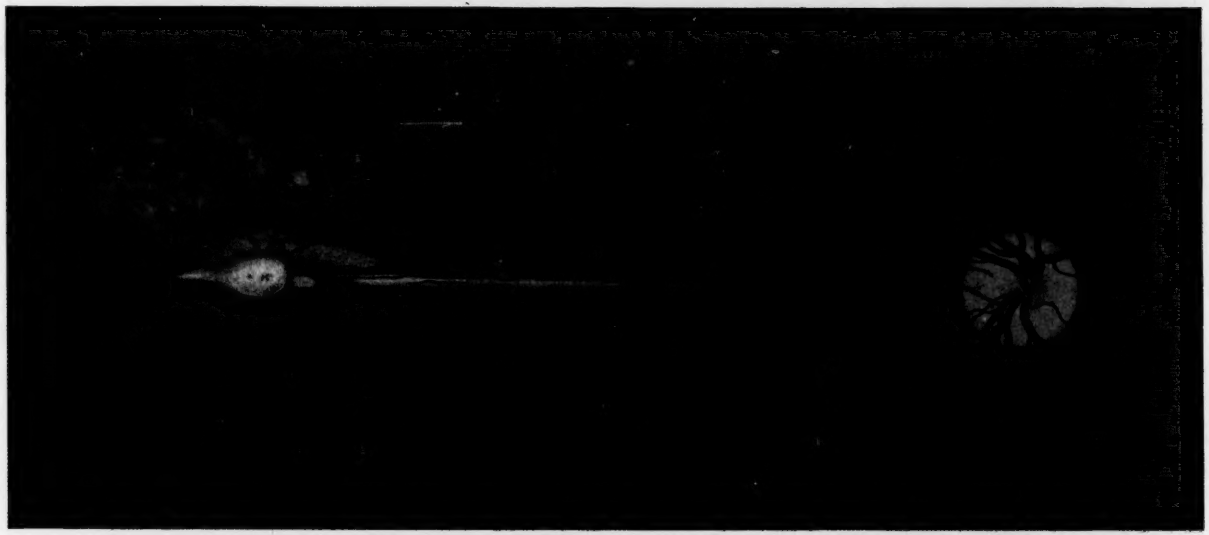


PLATE III.

Ophthalmoscopic picture showing puckering of the retina due to a penetrating F.B. To the oval opalescent swelling is attached a band of fibrous tissue in the vitreous which indicates the track of the F. B. See also field in this case, Fig. 29.

PLATE IV.

Two scars on the retina, one on each side of the disc, bridged across by a fan of haemorrhagic fibrous tissue, which came forward to the region of the scleral scar.
Inset shows the foreign body lying far forward embedded in blood stained vitreous.

PLATE V.

Drawing showing the course of a penetrating foreign body which passed through the cornea, iris, lens, vitreous and came to rest at the optic disc. There was an adherent leucoma, a hole in the iris, an opaque track through the lens, a fibrous band passing from the back of the lens to the optic disc. The disc is covered by a mass of fibrous tissue through which the retinal vessels emerge. See also Fig 33.

FIG. 1.

FIG. 2.

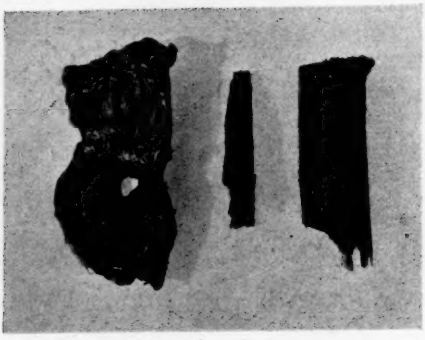


FIG. 3.

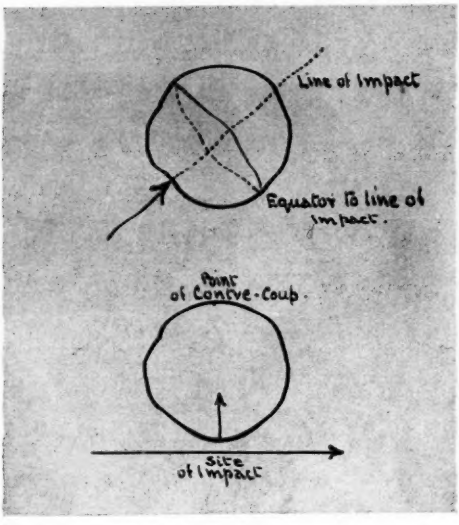

Line of Impact
Equator to line of impact.
Point of Contre-Coup.
Site of Impact

FIG. 4.

FIG. 5

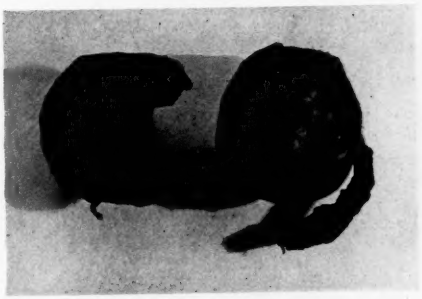


FIG. 6.

FIG. 7.

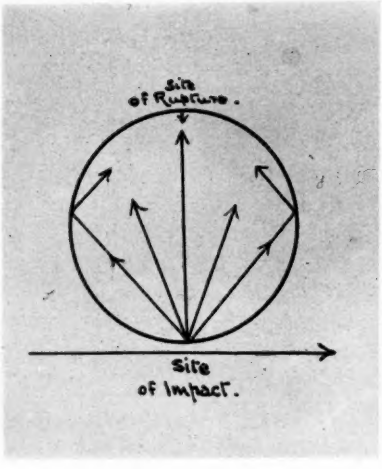


FIG. 8.

FIG. 9.

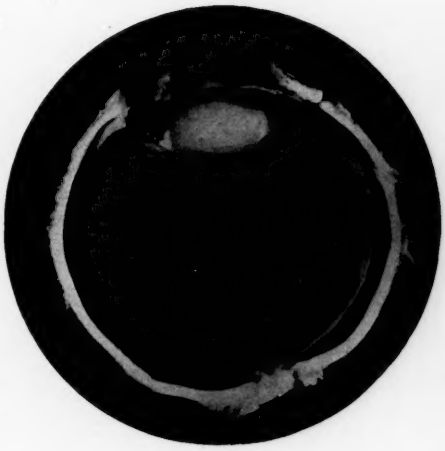


FIG. 10.

FIG. 11.

FIG. 12.

FIG. 13.

FIG. 14

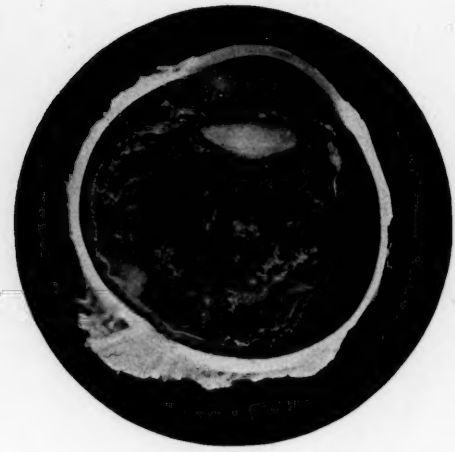


FIG. 15.

FIG. 16.

FIG. 17.

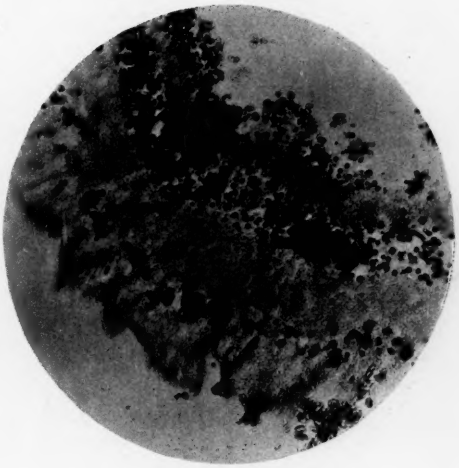


FIG. 18.

FIG. 19.

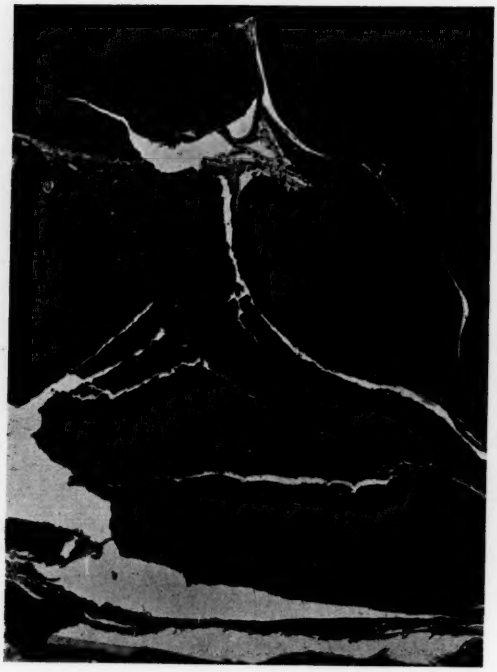


FIG. 20.

FIG. 21

FIG. 22.

FIG. 23.

FIG. 24.

FIG. 25.

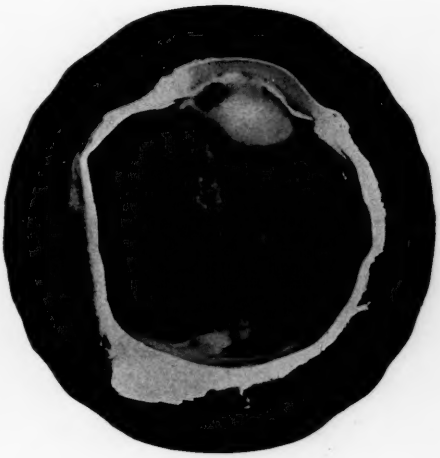


FIG. 26.

FIG. 27.

FIG. 28.

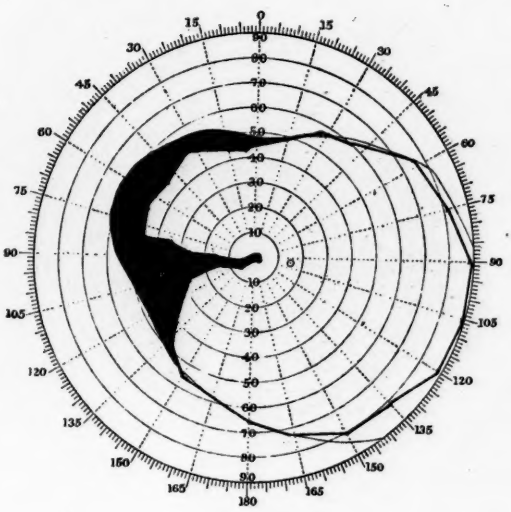


FIG. 29.

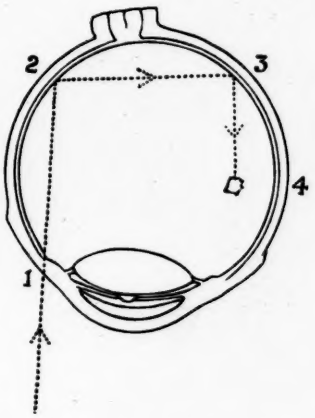


FIG. 30.

Penetrating foreign body. Supposed track of foreign body.

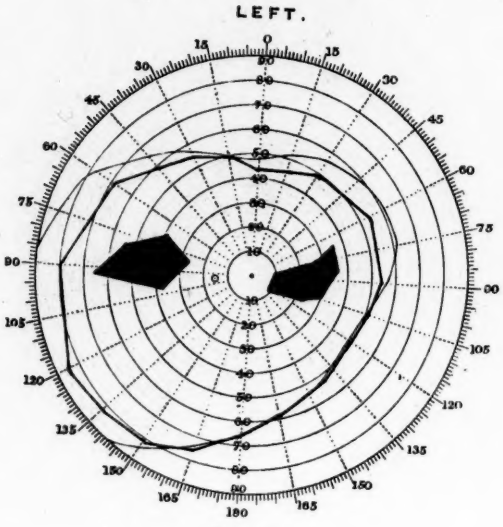


FIG. 31.

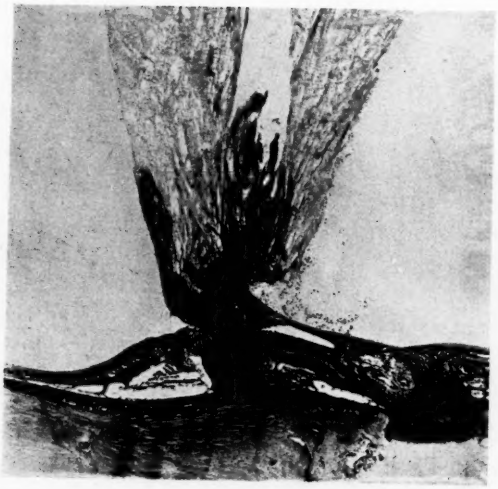


FIG. 32.

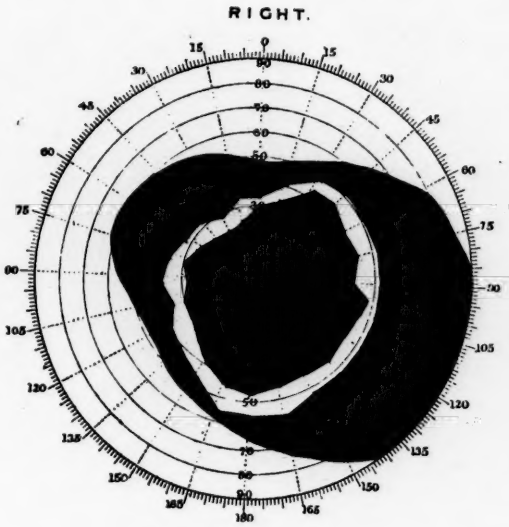


FIG. 33.

The field of vision shows a large central scotoma and periphery contraction, between which has been left a nearly circular ring field. See also Plate V.

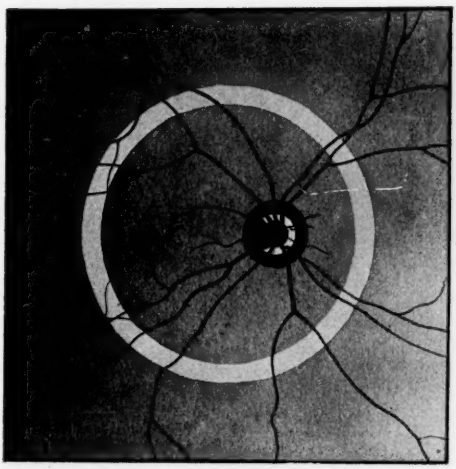


FIG. 34.

THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

JULY, 1924

COMMUNICATIONS

SOME CONCUSSION CHANGES MET WITH IN MILITARY PRACTICE*

BY

SIR WILLIAM LISTER

LONDON

IN seeking for a subject for my address I have chosen certain of the concussion changes in the eye which, for the most part, are seldom seen apart from military practice.

With regard to the illustrations, I wish to acknowledge my indebtedness to the Committee of Medical Research for kindly allowing me to use some ophthalmoscopic drawings made for them by Mr. A. K. Maxwell under my supervision; other ophthalmoscopic drawings were made by Mr. A. W. Head.

My remarks will be divided under the following headings:

(1) Ruptures of the sclera.
(2) Concussion changes of the iris and ciliary body.
(3) Concussion changes in the retina and optic nerve.
(4) Evulsion of the optic nerve.
(5) The effects of foreign bodies striking the retina.

Rupture of the Sclera

I will take first ruptures of the sclera, a subject I dealt with in a lecture at the Royal College of Surgeons, the illustrations for which have never been published.

* The main part of this paper was read at a meeting of the American Academy of Ophthalmology and Oto-laryngology at Washington in 1923.

In civil life, it is well known that by far the greater number of ruptures of the sclera are concentric with the cornea, and take place either immediately above, or above and on the inner side, about 3 mm. from the limbus.

In military practice, on the other hand, though similar injuries may be seen, other very different ruptures are met with; for example, the cornea may be burst forwards, or we find equatorial ruptures, or the whole sclera may be split into lobes.

In summarizing our experience of ruptures of the sclera, we find that we have two main groups, according to whether the missile *has* or has *not* penetrated the globe.

We will first consider the *ruptures of the eye caused by a penetrating missile.*

The elasticity of the sclera will accommodate the entry of small particles without rupture. When, however, the fragment is of such a size and has such velocity that the united effect of the increase in volume caused by the entry of the body, together with the distending force of the pressure wave set up by its impact, is sufficient to overcome the elasticity of the supporting coat, wide-spread ruptures occur.

When a sufficiently large foreign body passes through the *back* of the eye, the cornea is shot forwards and the contents ejected; an effect comparable with that produced by firing a bullet through a canister full of water, when both the lid and the water are shot upwards. Fig. 1 shows an almost complete tearing away of the cornea due to a fragment passing through the posterior part of the globe and orbit.

When, however, such a fragment enters the *front* of the eye, there is an explosive effect, and the sclera is split into numerous lobes by radial ruptures which extend backwards from the point of entrance, in some instances as far as the optic nerve, so that when the sclera is removed, it resembles the calyx of a flower. The following two specimens illustrate this form of rupture:

Fig. 2 shows the effect of the passage of a small particle right through the eye into the orbit. The sclera is seen split into numerous leaves, the lines of cleavage radiating out from the point of entrance.

Fig. 3 shows the result of large splinters of wood driven into the eye, splitting the sclera into two halves.

When the sclera is not perforated by the missile, the rupture does not start from the point of impact, but occurs at some considerable distance from it.

Rauber found, when investigating the effects of blows on hollow spheres, that the resistance of the envelope to pressure is one-third greater than its tensile strength. An eyeball would thus tend to burst at some distance from the point of impact

sooner than give way where the pressure is applied. In practice, we find that the site at which rupture takes place is most commonly either in the equatorial zone about the line of impact, or immediately opposite to the point of impact (i.e. at the point of contrecoup), and that these two sites of rupture are associated with two different kinds of blow. (Fig 4.)

(a) The ruptures caused by *slowly moving objects which strike the eyeball directly* without penetrating globe or orbit, occur in the equator around the line of impact, at a point where the globe is least supported. This group will include the bulk of ruptures met with in civil life, which are caused by the direct impact of objects such as stones, fists, boots, sticks, cows' h etc.

According to von Arlt's theory, indentation of globe due to the impact of slowly moving missiles, by lessening the diameter in the line of impact, must necessarily cause an increase in the diameter in the equator round this line. Since a sphere has the greatest cubic content for a given surface, any force which distorts a sphere containing a practically incompressible fluid, must bring about an increase of surface—that is to say, the envelope will be distended. The eyeball, being supported both at the place of impact and at the pole opposite to this, distension will take place chiefly at the equator round the line of impact, and if the distension is sufficient to overcome the tensile cohesion of the sclera, rupture will take place at some point on this equator where the globe is least supported.

The *site of impact* of such objects mentioned is at the anterior half of the eye, usually down and out, since protection is afforded to other parts of the eye by the brow, nose and cheek. The *line of impact* from a blow below and to the outer side of the cornea, will pass from below upwards and backwards and inwards; the least supported portion of the equator to that line of impact will be above and to the inner side of the cornea, and this is the place at which civil ruptures usually occur.

(b) In contrast to these we find that ruptures caused by *rapidly moving missiles which pass through the orbit but do not strike the eye directly*, occur at the side opposite to the point of impact—i.e., at the point of contrecoup. For example, missiles passing through the back of the orbit cause the cornea to be burst forwards; or if they have passed through the side of the orbit, the rupture may be found near the equator on the opposite side.

The following specimens illustrate these forms:

Fig. 5 shows rupture of cornea from passage of bullet at back of orbit.

Fig. 6 shows a similar condition due to the passage of a bullet through both orbits. Both optic nerves were divided by the

missile; one at the optic foramen, the other close to the back of the globe. In the former the globe was whole; in the latter, though the back of the globe was intact, the sclera at the limbus was ruptured and the cornea thrown forward. Both eyes were proptosed, projecting right in front of the lids. The patient was complaining of such intense pain that, much against one's inclination, both eyes were removed.

Fig. 7 shows a large equatorial rupture on the inner side of the globe following the passage of a missile through the outer side of the orbit.

In these cases, the globe is not deformed by direct pressure, but is subjected to an indirect impact, or shock, due to the passage of the missile through the orbit. If the globe is not deformed, the equatorial zone will not be overstretched, and therefore von Arlt's theory will not afford an explanation.

I am greatly indebted to Dr. Love, F.R.S., Professor of Physics at Oxford, who kindly considered the problem and has put forward the following explanation.

The contents of the globe being fluid, sudden impact at one spot on the surface will cause a wave of pressure to radiate through the vitreous from the point of impact. (Fig. 8.) The more rapid the impact, the more forceful the wave of pressure; the slower the impact, the less forceful the pressure wave.

The wave of pressure will be felt most by the sclera exactly opposite to the point of impact, where the wave strikes at right angles to the surface, while at the sides, where the wave strikes obliquely, the pressure will be less. Thus, it is familiar to us all that a wave of the sea which strikes a breakwater at right angles dashes much higher than one which strikes obliquely.

Again, where the incident wave strikes the sclera there will be a *wave of reflexion*, which will beat back against the incident wave. This wave of reflexion will only directly oppose the incident wave immediately opposite the place of impact; at other parts of the spherical surface, the wave of reflexion will be directed more or less away from the incident wave.

Professor Love, when calculating the effects of air waves, found that where the wave of reflexion met the incident wave the pressure is enhanced, it may be as much as eight-fold.

Though one cannot insist too closely on the similarity of the effects produced by air waves and those caused by waves in the semifluid vitreous, yet it would seem certain that a corresponding enhancement of pressure must take place in the eye at the point of meeting of the wave of reflexion and the incident wave.

Theoretically, the point of meeting of the incident and reflected waves will not lie exactly at the internal surface of the globe, but slightly nearer to the centre of the eye. This distance, however,

will be infinitesimal, and consequently the enhanced pressure will be transmitted to, and borne by, the sclera immediately opposite the point of impact.

It is common knowledge with what force a sea wave reflected from a breakwater meets the oncoming wave. So great is the pressure here that a mass of water is shot up into the air. In this instance the wave of reflexion beats back against the succeeding wave, but in the eye the wave of reflexion will beat back against the incident wave. In the open, the breakwater does not bear the brunt of this enhancement of pressure, but in a closed space, such as the eye, this pressure must be borne by the walls.

It would therefore appear that the stress on the sclera produced by the incident wave, plus the enhancement of pressure due to the meeting of the incident and reflected waves, will be far greater at the point of contrecoup than at any other part of the globe, and thus ruptures at the point of contrecoup may be explained.

Concussion Changes of the Iris and Ciliary Body

Passing to concussion of the iris and ciliary body, I regret I have little original to say about these conditions, some of which are met with fairly frequently as clinical pictures; we, however, seldom have reason for removing eyes with such injuries, and therefore rarely have the opportunity of examining the condition pathologically.

Fig. 9 is a specimen of iridodialysis which illustrates well the tearing away of the root of the iris from the ciliary body.

Much more rare than iridodialysis—with its consequent displacement of the iris centrally, giving rise to the D-shaped pupil—is dislocation of the iris peripherally, which produces a pear-shaped pupil in the slighter injuries or an "apparent iridectomy" in those more severe.

These "apparent iridectomies," or peripheral dislocations of the iris, have features which distinguish them, as a rule, from true iridectomies. Thus (1), the pupillary margin, together with the pattern of the iris, passes right up to the coloboma, so that there are no cut angles of the sphincter to be seen; (2), there is no scleral scar; (3), no entanglement or prolapse of the iris; (4), the rest of the pupil remains central and circular; (5), there is a history of a blow, but no history of an operation. If, however, an iridectomy had been done, either the cut angles of the sphincter would be visible, or if these had been drawn up to the wound, there would usually be signs of entanglement or prolapse in a scleral scar, and the remaining portion of the pupil would not be circular, but drawn up toward the wound.

Such cases of "apparent iridectomy," or peripheral dislocation of the iris, are accounted for either by:

(1) Retroflexion of the iris, i.e. the iris is bent back and caught between the ciliary body and lens (Fig. 10), or by:

(2) A rent in the ciliary body—

(a) In some, the rent is in the substance of the ciliary body, separating the circular from the longitudinal fibres. (Figs. 11 and 12.)

(b) In others, the rent occurs at the junction of the ciliary body with the sclera, viz., a "cyclodialysis." (Figs. 13 and 14.)

In either case, the iris with the circular fibres alone, or with the whole thickness of the ciliary body, circular and longitudinal fibres together, slide outwards towards the equator of the eye. According to the extent of the displacement, so is the clinical picture. If the displacement is less than the width of the iris, a pear-shaped pupil results; if, however, the displacement is as great as, or more than the width of the iris, a coloboma occurs. In very rare cases (Fig. 15), the cyclodialysis is complete, and the whole diaphragm formed by the lens, suspensory ligament, iris and ciliary body is dislocated backwards.

The usual explanation of these cases seems quite sufficient. Thus, when the cornea is indented by the missile, the contents of the eye being fluid and incompressible, a compensatory enlargement of the posterior segment of the eye must take place. The pressure of the aqueous forces back the iris against the lens, and, therefore, no fluid can pass through the pupil, with the result that the iris, lens or both must recede, or something must give way.

When the pressure is sufficient, the fluid wedge of aqueous humour may bring about any of the above-mentioned conditions, namely, iridodialysis, retroflexion of the iris, splitting of the ciliary body, or partial or complete cyclodialysis.

Concussion Changes in the Retina and Choroid

In civil life, the changes are, for the most part, due to blows from comparatively slowly moving objects, which strike the anterior part of the eye directly. These blows cause disturbances located chiefly in the macular and perimacular region: viz., commotio retinae, detachment of the retina, choroidal ruptures, pigmentary changes in the macula, retinal haemorrhages and retinal rents, with which we are all familiar.

In military practice, similar changes caused by blows from stones, clods of earth, etc., were met with; but in addition, concussion changes were seen caused by rapidly moving missiles, which passed through the orbit without rupturing the sclera,

concussing the eye equatorially or in the region of the posterior pole. They gave rise, when examined soon after injury, and when the vitreous was not clouded by haemorrhage, to one of the most dramatic appearances the ophthalmoscope reveals. We saw great blood red clouds of haemorrhage in the retina interspersed with glistening white areas. (Plate I.)

If examined some weeks later, a great alteration was found to have taken place. The glistening white areas had vanished; the haemorrhages, for the most part, had disappeared or were in process of absorption, or they had been replaced by fibrous tissue plaques in the substance of the retina or in the vitreous. These plaques often had festooned margins, and at times appeared perforated by round or oval holes. (Plate II.) The probable explanation of the festooned edging is, that the plaques had been at one time larger, and were attached to the retina at certain spots on their periphery: as contraction took place, the outline became bayed between the fixed points. It is more difficult to account for the holes in the plaques, but on the supposition that complete absorption takes place at a certain spot in the plaque, retraction of the fibrous tissue will leave an oval or circular hole.

These concussion changes in the retina and choroid occurred in three situations:

(1) The area always affected was that adjacent to the site of impact. So constant was this, that in cases in which the entrance wound was insignificant, the ophthalmoscope gave the first means of information that a foreign body had traversed the orbit.

(2) The next most common site to be injured was the macular region, and it is to be noted that the disturbed area at the macula was often quite separate from that adjacent to the site of impact. It is probable that the greater vascularity and delicacy of structure of this region rendered it more vulnerable to the intraocular waves of pressure.

(3) In a few cases, haemorrhages were also found opposite the site of impact. Professor Love's theory of the rupture of the sclera at the point of contrecoup explains such lesions, and if I am allowed to digress for a moment, it also explains how it is that severe blows on the skull cause bruising of the brain at the pole opposite to that which is struck.

Turning to the histological changes found in these injuries, I regret I am unable to show you any specimens demonstrating the changes in commotio retinae. It is, however, known that in concussion of the brain, imbibition of fluid takes place in the colloidal brain matter; it is attractive to suppose that the retina, being part of the brain, may also imbibe fluid after concussion, giving rise to the appearance commonly described as "oedema of the retina."

The haemorrhages in and about the retina and choroid are of every variety, subhyaloid, inter-retinal and subchoroidal. (Fig. 16.)

The four main changes found in the retina are:

(1) The shrinking and disappearance of the nuclei of the granular layers.

(2) Vacuolation of its substance.

(3) The splitting of the retina into layers.

(4) Folding of the retina.

The degree of changes in the retina varies greatly in different specimens, and also in different parts of the same specimen.

In the less affected parts, we may find merely a partial and patchy atrophy of the nuclei of the external and internal granular layers, demonstrated by a diminution in size, so that these vary from the normal to minute dots. (Figs. 17 and 18.) (This is comparable with the shrinking of the nuclei seen in atrophic areas of glioma of the retina.) With the shrinking and disappearance of the nuclei, the retina loses its staining capacity, so that one finds all stages from a diminution in the size of the nuclei, occurring in patches, to a practically non-staining band in which all traces of nuclei have disappeared.

Associated with the atrophy in the granular layers, the nerve fibre, ganglion and reticular layers also undergo changes. They become spongy, vacuolated and in places cystic. (Fig. 19.)

In the more severe cases the retina may be found split by haemorrhages into several layers. (Fig. 20.)

Every variety of wrinkling of the retina occurs; it may be fairly flat or it may be thrown into complicated convolutions. The combined effect of necrosis with splitting and folding of the retina gives some of these sections a remarkable and characteristic appearance, which may be compared to a tangled skein of a ghost-like retina wriggling through a mass of blood clot. (Figs. 21 and 22.)

To what are these atrophic changes in the retina due? In all the specimens examined, the blood vessels were severely damaged and, therefore, the nutrition of the retina must have been greatly impaired. Is the cutting off of the blood supply the only cause of the atrophy, or is there some other factor? It is very striking, that in certain specimens where the blood supply was completely cut off by rupture of the arteria centralis retinae and the short ciliary arteries, the atrophy of the retina was not universal but only partial.

Given sufficient time, the cutting off of the blood supply would of course cause atrophy of the retina, which one would expect to be uniform. In the cases mentioned, it would seem, therefore,

that there was some other causative factor for necrosis in addition to the cutting off of the blood supply. What can this other injurious factor be? The only suggestion which appears to me reasonable, is that the concussion brought about sudden death of certain parts by direct application of force. Such a view is well supported by the investigation of concussion of the spinal cord by Gordon Holmes, which he described in his Goulstonian Lectures. He showed that areas of atrophy occurred in the cord, after the passage of a missile in the immediate vicinity, apart from any haemorrhage or visible vascular change, and he attributes such atrophy to the effect of direct concussion.

Though I have no specimen of concussion of the cord, I have a case of division of the optic nerve by a missile, which demonstrates the loss of staining power at the site of the lesion and the vacuolation and absence of nerve structure in this region. (Figs. 23 and 24.)

From what we have seen it appears evident that the concussed retina is an *atrophic* retina, associated with varying degrees of corrugation, but we have yet to correlate the ophthalmoscopic with the histological appearance, and to try to determine the nature of the glistening white areas. Here we meet with a difficulty. On the one hand, the concussed eyes which could be profitably examined with the ophthalmoscope, we had as a rule no justification to remove, and we could not, therefore, cut sections of a given area of retina in which the white spots had been seen. On the other, in severely concussed eyes which were both blind and painful, and which were excised, careful search failed to discover any white spots. What had happened to them? Had absorption taken place before the excision of the eye of some substance which gave rise to the white appearance, or had the formalin, which was the fixative used, dissolved this material and rendered the retina transparent?

I am unable to answer these questions with certainty, but I should like to make a comparison which I think may throw light on the subject. In embolism of the central artery, the retina is white and undergoing coagulation necrosis. In time, the white appearance disappears as the retina passes into complete atrophy, just as the white appearance disappears in a concussed eye. Though the glistening patches in a concussed eye appear whiter than the retina whose artery has been blocked, this effect is probably due to contrast, for while in embolism haemorrhages are uncommon, and there is nothing dark in the fundus to show up the white patches, in concussed eyes the white areas are frequently surrounded by extensive dark red haemorrhages.

In the absence of direct proof, it thus seems a likely hypothesis, that the glistening white areas in concussed eyes are areas of retina in which coagulation necrosis has taken place.

Evulsion of the Optic Nerve

In the transactions of the Ophthalmological Society of the United Kingdom a paper by Montague Hine and myself is published on evulsion of the nerves—which is fully illustrated. A few additional remarks may be made.

Looking back at the various ophthalmoscopic pictures which have been shown and published, to which the term "evulsion of the nerve" has been applied, one may suspect that a considerable number may have been illustrations of "division" of the nerve without "evulsion."

The special feature of many of the drawings labelled "evulsion of the nerve" is a mass of fibrous tissue covering the disc, and a disappearance of the blood columns in the retinal vessels.

But an anterior division of the nerve by a missile passing through the orbit will cause similar severe concussion changes in the retina, with formation of fibrous tissue which may cover the head of the nerve, and provided the lesion is sufficiently far forward to stop the circulation in the central retinal vessels, an identical clinical picture will be produced. It is impossible to determine from these pictures the crucial point, namely, whether the lamina cribrosa is intact or not.

It is probable, therefore, that only in those cases where the optic disc is unobscured by haemorrhage or fibrous tissue, and a definite pit is seen at the site of the nerve head, can one state with certainty that evulsion has taken place.

In considering the aetiology of evulsion we find that it follows:

(1) Blows on the front of the eye.

(2) Penetrating wounds of the ball itself.

(3) Penetrating wounds of the orbit, either at the side or the back of the globe.

The actual mechanism of evulsion will vary with the nature of the injury. The nerve must be either pushed out or pulled out.

For evulsion to take place after a blow on the front of the eye or after penetration of a foreign body, or again after the lateral impact from missiles passing at the side of the orbit, the only mechanism that one can suggest is that the increase of intra-ocular pressure, which the injury produces, is sufficient to break the lamina cribrosa and expel the nerve. Hence such cases would be more correctly described as "expulsion" rather than "evulsion" of the nerve.

Though one might expect that rupture of the sclera would take place in one of the ways already mentioned in Section (I) more readily than a pushing back of the lamina cribrosa, yet the fact remains that the lamina is found broken through. In seeking

for an explanation, it must be remembered that the lamina is very weak and at most represents only one-third of the fibres of the sclera, and also that the nerve itself is only slenderly attached to its sheath. When once, therefore, the transverse fibres of the lamina have given way, there will be little resistance to expulsion of the nerve, and the appearance of the empty sleeve would be accounted for.

On the other hand, the nerve can be pulled out in one of two ways, either by the explosive effect of a missile passing through the back of the orbit, or by extreme rotation of the eye; in both instances the optic nerve will be severely stretched.

Dr. Turnbull kindly prepared sections for me of the optic nerve and sheath, staining them to demonstrate elastic fibres. These conclusively show, that while the sheath contains elastic tissue, the nerve contains none. The sheath is thus more elastic than the nerve. The explosive effect of a missile passing through the back of the orbit will have the double effect of forcing the eyeball forwards, and thus stretching the nerve, and at the same time pushing the nerve out of its course, putting it still further on the stretch. If the sheath is stretched, its contained nerve tissue, being less elastic, will tend to break rather than stretch. Why should the nerve break at its junction with the retina, rupturing the lamina cribrosa, and be pulled back like a piston in a cylinder, instead of breaking in its continuity? This may be explained by the fact, that between the lamina and the retina, the nerve tissue consists almost entirely of naked axis cylinders, whereas behind the lamina, the nerve has strong supporting fibrous lamellae which are continuous with the lamina. (Fig. 25.)* The nerve is, therefore, tougher behind the lamina than in front. If the nerve sheath is stretched, the toughened but inelastic nerve, sliding easily in its dural coat, tugs at the lamina, and when once this gives way, a rupture will tend to take place in front of this membrane, either in the retina itself or in the nerve fibres between the retina and the lamina. This also explains why we sometimes find a hole torn in the retina close to the disc, and in others a tangle of degenerated retina dragged into the open mouth of the sheath.

Lastly, we have to explain how extreme rotation of the eye from blows with sticks or poles may cause evulsion. Extreme rotation will cause tension on the nerve where it enters the globe, and especially on the side away from which the eye is rotated. If such tension be sufficient, rupture of the lamina cribrosa and evulsion of the nerve may take place, either complete or partial, for the elastic sheath will stretch, but the inelastic nerve will pull

*This micro-photograph was taken from a beautiful specimen stained by van Gieson's method and prepared by Mr. Humphrey Neame.

on the lamina and cause it to rupture (c.f. Lang's and Hesse's cases).

The Effects of Foreign Bodies Striking the Retina

I will conclude by describing a few specimens which demonstrate the effect on the internal structure of the eye of penetrating foreign bodies.

When a foreign body passes through the vitreous, it may leave a track which may be either filled by haemorrhage (Fig. 26), or subsequently marked out by a fibrous band. (Fig. 27.) The larger fibrous bands, by their contraction, may cause severe disorganization, such as detachment of the retina or choroid or both, or general distortion of the globe.

When a foreign body strikes the retina, a variety of things may happen. It may remain embedded in the retina in which case it often causes puckering of this membrane (Fig. 28; Plate III and Fig. 29); or if it strikes the back of the eye with sufficient force it may penetrate its coats and pass into the orbit.

It is not infrequent to find that a foreign body, having struck the retina, may rebound and come to rest far from its original track. We saw one case of which the only explanation one can offer is that a fragment rebounded twice on the retina. (Fig. 30.) There was a slightly pigmented scar in the sclera at the entrance of the foreign body on the inner side of the cornea. The ophthalmoscopic picture (Plate IV) showed two scars on the retina, one on the inner, the other on the outer side of the disc. These were connected by a fan of fibrous tissue, which could be traced forwards towards the wound of entrance. The foreign body was seen glistening like a jewel in the blood-stained vitreous, situated far forwards and on the outer side. An X-ray photograph demonstrated the foreign body at a spot which corresponded with the ophthalmoscopic estimation, and there was no indication of any other foreign body in the orbit. The field of vision (Fig. 31) showed two scotomata situated in the horizontal meridian corresponding with the two scars on the fundus.

When a foreign body strikes the retina, it will certainly bruise it and in most instances cut it. I have sections of a case in which a foreign body bounced on the retina and was later removed by means of Haab's magnet. The spot where the foreign body struck the retina was indicated by the attachment of the vitreous. The sections through the spot (Fig. 32) showed the retina to be divided, and the gap thus caused was occupied by a plug of newly formed fibrous tissue, which was continuous with the shrunken and haemorrhagic vitreous, in which fibrous tissue was beginning to replace the blood.

Following these minute injuries of the retina in eyes which had not been too severely disorganized, we were at times able to correlate the visible lesions with the corresponding defects in the field.

Thus we found that lesions above or below the horizontal plane caused a defect in the field out of all proportion to the local disturbance, i.e., there was a "distribution defect" in addition to the local defect due to the lesion. This was due to the foreign body having not only damaged the rods and cones at the spot which it struck, but having there divided the nerve fibres which were passing on to a more peripheral portion of the retina. The distribution defect was fan-shaped from the point corresponding to the lesion, and extended towards the periphery or the median raphe. The nearer the lesion was to the disc, the greater the blind sector and *vice versa*, as would be expected from the accepted distribution of the nerve fibres in the retina.

When a lesion occurred in the horizontal line drawn through the disc, there was no "distribution" defect, but the loss of field was limited to the area corresponding with the lesion, as would be expected, for the median horizontal raphe is the terminus for all nerve fibres on this line. (Fig. 31.)

These sector defects following injury of the retina are strikingly similar to those following solitary patches of choroiditis, in which the resulting blind area is best explained on the supposition that the nerve fibre layer is involved and destroyed by the inflammatory process as it passes over the patch of choroiditis. This supposition is supported by microscopic examination of a patch of choroidal atrophy, which frequently shows complete disorganization of all layers of the retina, together with the choroid.

The last case I wish to bring to your notice, is one in which a minute particle perforated the cornea, iris, lens and vitreous, and struck the optic disc a "bullseye." There was an adherent leucoma, a hole in the iris, and an opaque streak through the lens, from which there extended a delicate fibrous band, through the vitreous, to the mass of inflammatory tissue covering the disc and the parts immediately around. (Plate V.) An X-ray photograph proved the presence of a foreign body situated on the disc; the rest of the fundus was normal. The astonishing fact is that this lesion caused a nearly circular "ring" field; that is to say there was a very large central scotoma, a considerable peripheral contraction of the field, and between the two a nearly circular band in which vision was retained. (Fig. 33.) In the absence of histological investigation of the nerve head, one can only guess the exact portion of the nerve which had undergone degeneration, and how the foreign body caused the circumscribed injury, whether by direct impact or by subsequent degeneration following the injury.

According to the generally accepted views regarding the distribution of the nerve fibres, those in the outer third of the disc supply the macular area, the most peripheral fibres of the disc supply the retina in its immediate neighbourhood, while those in the centre are the long distance fibres, which supply the periphery of the retina. Between these three sets of fibres there would be a horseshoe shaped zone on the disc (Fig. 34), the fibres from which would pass to the portion of retina corresponding with the above-mentioned ring field. It would hardly appear credible that a complete "ring" field could have been left, yet it has to be accepted as fact, since the field was taken most carefully on two separate occasions, at an interval of several weeks, and the two fields were practically identical.

The important fact which emerges from this case, is that *a wound of the disc led to a double concentric defect of the field.* The case thus falls into line with certain cases of optic nerve disease such as are met with occasionally associated with Ring Scotoma, e.g., Tabetic Atrophy, and Retrobulbar Neuritis, and it also gives support to the possible view that retinitis pigmentosa, with its concentrically defective fields, may be primarily a disease of the nerve.

Lastly, it appears to prove that the nerve fibres which are in association with the various concentric zones of the retina, and which will be distributed to the corresponding zones in the appropriate superior and inferior calcarine areas of the occipital lobes, are arranged in definite zones in the optic nerve.

THE ARROW TEST FOR ASTIGMATISM

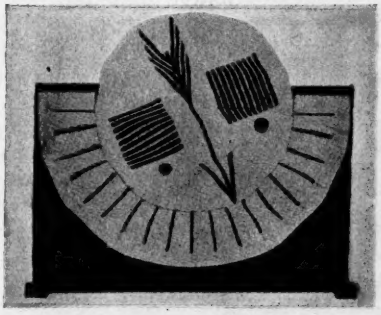
BY

ERNEST E. MADDOX, M.D.

BOURNEMOUTH

THOUGH arrows have long ceased to form a part of modern "artillery," their shape has become so impressed upon the mind of both young and old that they make excellent test objects for astigmatism. The figure of an arrow printed upon a rotating disc locates the axis, both by means of its feathers, and of the two barbs of the arrow head. There is an advantage in the double choice, for some eyes are more sensitive in comparing groups of lines than single ones, while other eyes too rapidly experience chromatic sensations from the former to make them of service for testing. Here the two barbs of the arrow head can come to the rescue, being single lines, and thus free from chromatism.

To make use of the test, the patient need only be armed with the spherical lens (arrived at by retinoscopy or otherwise) which makes one meridian emmetropic and the remainder myopic, in other words the highest plus (or weakest minus) lens compatible with best vision of the test types. Then the inverted fan will show approximately where to place the arrow to start with. Its point should touch the blackest spoke of the fan, or occupy the middle of the blackest group. If the brightest spokes are scattered in different parts of the fan the astigmatism is "irregular," and the case more suitable for the test types only. The arrow should then be turned in the direction of the cleanest feather, or the faintest barb, till the two sides agree in clarity. If the patient's



head be truly erect the point of the arrow indicates the axis with great exactitude.

After locating the axis, it remains to measure the amount. The eye should now be emmetropic for that square whose lines are parallel with the shaft of the arrow, but if not should be made so by modification of the spherical lens before it. The disc is provided with a mark upon its edge at 90° from the arrow point which at once indicates the axis of the minus cylinder required to bring the square of transverse lines into equal clarity with its fellow. Before prescribing, it is as well to ascertain from the test types how much of the full correction is appreciated.

As in all fan and line tests the one difficulty without a phorometer is that of keeping the patient's head erect. A simple expedient may be suggested; if a slight tilt of the head seems incorrigible, the instrument as a whole can be tilted by an equal angle in the same direction. Clearly, however, no correction is so satisfactory as a well placed head.

The apparatus is made by Messrs. C. W. Dixey and Son, of 3, New Bond Street, London.

A CASE OF TUBERCULOUS CHOROIDITIS TERMINATED BY MENINGITIS AND MULTIPLE BRAIN ABSCESSES

BY

T. MILNES BRIDE

MANCHESTER

E.E., female, aged 36 years, came under my care at the Manchester Royal Eye Hospital on November 7, 1921.

The history given was that the vision of the right eye had been failing for a few weeks. Examination of the right eye revealed the following:

"The eye is normal externally, the pupil reacts equally with its fellow, the lens and vitreous are clear, there is a large ballooned detachment of the retina below, around, and about which and the disc are multiple areas of atrophy of the choroid with patches of pigmentation, the disc itself appears healthy, the vision is reduced to the counting of fingers at a few feet, intraocular tension normal."

The left eye is normal and has normal vision.

The patient is a well-nourished woman and appears in good health; her left breast was removed by radical amputation for scirrhus carcinoma in May, 1921.

A general examination was made by Dr. Core, Physician to the Hospital, who reported as follows:

"There is pain at the right base with some signs of pleural adhesions and collapse of the lung in the right postero-lateral region of the chest; these are not diagnostic of any intrathoracic metastasis but are somewhat suggestive of it. The heart is rapid, no structural disease in the abdomen, pulsatile aorta, no enlargement of liver."

Dr. Arnold Renshaw reported as follows:

"The Wassermann reaction is negative in a dilution of 1 in 5. von Pirquet's cutaneous reaction is negative to human and bovine tuberculin."

The diagnosis appeared to lie between tuberculosis of the choroid and secondary malignant deposits; transillumination of the eye did not reveal any shadows. The patient was examined weekly until the end of December, 1921.

On January 8, 1922, she was admitted to Withington Hospital in a semi-conscious state with twitchings of the extremities and occasional vomiting. I was not informed and did not see her; she died on the 11th.

The post-mortem examination was unfortunately incomplete, and only the brain was examined; this showed general meningitis

with multiple abscesses in the brain substance which were diagnosed as tuberculous. The eye was not obtained.

The interesting point arises as to whether it would have been wise to remove the eye. Looking back on it I think it would, as there were no definite signs of tubercle elsewhere.

A CASE OF INTRA-OCULAR SARCOMA OF UNKNOWN ORIGIN CAUSING THE SYMPTOMS OF AN ACUTE HYALITIS

BY

T. HARRISON BUTLER

AND

ERIC W. ASSINDER

PATHOLOGIST, BIRMINGHAM EYE HOSPITAL

THIS case seems worthy of record, first, because there is some doubt as to whether the tumour arose from the sclera or from the choroid, and, secondly, because it gave rise to symptoms that suggested a septic hyalitis.

Ada C., aged 28 years, was admitted to the Birmingham Eye Hospital complaining of great pain in her eye.

History. Was confined three weeks ago. There was nothing abnormal during the confinement or the puerperium.

For the past eight months she has noted that the sight of the left eye was dull.

For the past few days the left eye has been inflamed and painful.

Present condition. The patient is obviously ill, her breath is foul, and her temperature raised.

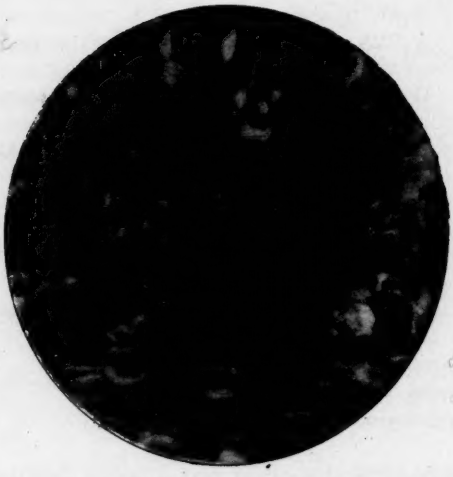
The left lids are oedematous. The eye is intensely injected. The cornea is steamy, and the tension is plus 3.

On the temporal side, deep in the eye, there is seen a pinky yellowish mass. The retina is detached over it.

Transillumination gives an opaque shadow on the temporal side.

It was considered that there was a septic inflammation of the eye, and that the mass was inflammatory. It was supposed that the septic condition was connected with the confinement. The general condition of the patient, who was quite obviously very ill, lent support to this view; although the fact that the eye had been abnormal for some months was against this diagnosis.

Section of spindle-celled sarcoma



Section of spindle-ceiled sarcoma. Higher Magnification.

The eye was excised. The effect of the operation upon the general state of the patient was almost magical. In two days she felt and looked perfectly well, and her temperature fell to normal.

Pathological examination of the eye

When the eye was bisected a spherical white tumour the size of a small cherry was seen attached to the sclera on the temporal side. It had the appearance of growing from the sclera and its macroscopic appearance was similar to that of scleral tissue. The attachment to the sclera was stalk-like. At its periphery it was again firmly adherent to the tunics of the eye and appeared here to be growing from the sclera.

The tumour on section showed a spindle-celled, non-pigmented sarcoma.

The fact that the tumour is non-pigmented is in favour of its scleral origin: most choroidal tumours are pigmented, but not all. On the whole, I (E.W.A.) am in favour of the choroidal origin, and I consider that it has arisen from non-pigmented cells in the choroid, and that its stalk-like attachment to the sclerotic is an invasion of the sclera by tumour cells.

ANNUAL CONGRESS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

THE Twelfth Annual Congress of the Society was held at Glasgow on Thursday, Friday and Saturday, May 1-3, 1924.

This is the first extra-Metropolitan meeting of the Congress since it became an annual event. The meetings were well attended, and the admirable local arrangements did much to render the Congress an unqualified success.

The President, Dr. A. Maitland Ramsay, was in the chair, and the meetings were held in the Department of Zoology of the Glasgow University, and on Friday evening in the Anatomical Theatre.

The proceedings opened by a cordial address of welcome to the Congress by Sir Donald MacAlister, Bart., Principal of the University. This was immediately followed by the discussion, which was on "The Physiology and Pathology of the Pupil Reactions."

Sir JOHN PARSONS opened with a very comprehensive survey of our present knowledge of the subject from the physiological standpoint. He described the musculature and nerve supply of the pupil, the proof of the presence of dilatator fibres, the light, sensory and associated reflexes. The various experimental and pathological proofs of the course of the light reflex and the very close association of the visual and pupil responses to light were also reviewed.

He discussed the retained reaction of the pupil to light in cases of optic atrophy with blindness. He next considered the state of

our knowledge with regard to the pupillo-constrictor fibres in the mid-brain, and the course of the pupillo-dilatator fibres. The pupillo-dilatator centre was most probably situated in the hypothalamic region lateral to the infundibulum. Among other agencies that effect variations in size of the pupil he mentioned the activities of the endocrine glands. He also referred to the paradoxical pupil dilatation. The course of the various fibres was traced and the paper was illustrated by some excellent slides. In conclusion, the author mentioned thirteen facts, which must be satisfied by any scheme which was to represent the pupillary light reflex.

Dr. EDWIN BRAMWELL dealt with the subject from the point of view of the physician, who is accustomed to appraise a physical sign in accordance with the value of the information it affords. In speaking of brain tumours he referred to Bianchi's cases of fore-frontal tumour in which paroxysmal dilatation and contraction of the contra-lateral pupil was observed and which were believed to be of the nature of Jacksonian fits. He said that abnormalities of the pupil and associated phenomena which result from lesions of the sympathetic path he regarded as of the greatest value to the physician in diagnosis of many different conditions. He mentioned that a man might have miosis and an intra-thoracic aneurism but that the contracted pupil might be a tabetic manifestation. He questioned the value of the Wernicke hemianopic pupillary reaction, pointing out that doubt had been thrown on the value of the sign by its occurrence in cases in which the lesion appeared to involve the visual fibres above the termination in the optic tract. He emphasised the importance of the Argyll Robertson pupil, and drew attention to the fact that it occasionally incurred in cases that did not give the serological tests for syphilis, and that it had been recorded in disseminated sclerosis, lethargic encephalitis, chronic alcoholism, trauma, and mid-brain tumours. He also discussed the various views put forward as to the causation of this symptom.

Mr. AFFLECK GREEVES, reviewing the subject from the ophthalmological standpoint, dealt with the changes of size at different periods of life. He said that inequality of the pupils is frequently present in normal persons, and that hippus was frequently present in healthy individuals. The various pathological states of the pupil were then reviewed and the various conditions causing contraction, dilatation, alteration in shape, colour and inequality of the pupils. Alteration in colour and congenital abnormalities were described, and he concluded with the details of a case of cyclic contraction and dilatation of the pupil.

Mr. TREACHER COLLINS spoke of several interesting developmental conditions and his contribution was illustrated with numerous lantern-slides.

Mr. FOSTER MOORE described a series of 7 cases; 5 in females, and 2 in males, with the Argyll Robertson pupil reaction but unassociated with syphilis, and without any evidence of parasyphilitic or any other nervous disorder. The cases were probably congenital, and one case had been under observation for 40 years. The condition was frequently unilateral, it was not associated with paralysis of accommodation, and the pupils dilated well with mydriatics. The contraction with convergence and dilatation when convergence was released was characteristically slow.

Mr. PATON spoke of the Argyll Robertson pupil, and made the suggestion that the initial causal lesion might lie in a little recess lying behind the pineal gland and dipping down between it and the corpora quadrigemina. In this recess the spirochaetes might lie dormant for a long time.

Mr. G. F. ALEXANDER also spoke.

In the afternoon Professor GRAHAM KERR read a paper on "An Experiment in Binocular Vision." His experiment was devised to prove that by fusion of similar images increased intensity of the mental impression was obtained. In his opinion the summation of the images was similar to that occurring in animals possessing dozens, or even hundreds, of eyes.

The significance of the experiment was discussed by Sir JOHN PARSONS, Mr. PATON and Mr. ALEXANDER.

Sir ARNOLD LAWSON read a paper on "A Case of Bilateral Symmetrical Detachments of the Retina with Normal Vision." This was a very unusual case, in which a detachment was discovered on the outer side in the right eye. On further examination a similar detachment was found in the other eye, of which there had been no complaint. The patient had had a fall on the back of her head in 1915. General, X-ray, and rhinological examinations were negative. The patient was treated by rest in bed. The condition remained unchanged and is the same now as it was a year ago.

Mr. HEPBURN said he thought the condition might be haemorrhagic in origin. Mr. CRIDLAND also spoke.

Mr. A. F. MACCALLAN read a paper on "Twenty Years' Ophthalmic Work in Egypt," in which he described the numerous difficulties that had to be overcome before he was able to bring the ophthalmic service in Egypt to its present state of efficiency.

Mr. LESLIE PATON read a paper on "Some Ocular Complications of Spontaneous Subarachnoid Haemorrhage," in which he gave a valuable survey of the subject with copious references. The anterior part of the circle of Willis was the most common site of origin of the haemorrhage. He considered that haematoma into the nerve sheath was much commoner than might be deduced from the published statistics. The oculo-motor was the nerve by far most frequently affected. Papilloedema might follow the rupture

in a few hours if there was a block at the optic foramen. It might not occur for a week, and in some cases it was delayed some months. An unruptured aneurysm has been ascribed as the cause of ophthalmoplegic migraine. He recorded two cases which had come under his own observation, and he concluded that the subhyaloid haemorrhages that were present in them had tracked along the nerve sheath and come through the lamina cribrosa.

Prof. SNELLEN read a paper on "the Absence of Diplopia in Strabismus Concomitans," in which he reviewed the current theories and gave his own explanation.

The paper was discussed by Messrs. ALEXANDER, and HARRISON BUTLER the former of whom described an interesting case.

Dr. BROWNLOW RIDDELL'S paper was on "Eye Symptoms in the early Diagnosis of Disseminated Sclerosis." He had been much impressed by the frequency which with a retro-bulbar neuritis or a transient diplopia preceded, often by a long interval, the other evidences of the disease. He insisted upon all such cases being submitted to a thorough general examination and he quoted several striking cases which substantiated this.

The paper gave rise to an interesting discussion.

Dr. G. E. DE SCHWEINITZ said that disseminated sclerosis had been described as the disease of mystery. He reviewed several of the aetiological factors and referred to the current literature on the subject. He cited an interesting case with a central scotoma; this improved after an operation on one of the accessory sinuses, but later the patient developed definite multiple sclerosis. He said that the mere elimination of sinus disease was not sufficient and he urged more careful bacteriological investigation as to the kind of toxins involved.

Messrs. B. GRAVES, J. GRAY CLEGG, HARRISON BUTLER, BALLANTYNE, PATON, JOHNSON TAYLOR, CRIDLAND, and LEASK also contributed to the discussion.

The Clinical Meeting was held at the Glasgow Eye Infirmary on the morning of May 2nd. The meeting was well attended and a number of interesting cases were shown.

Drs. Harrison Butler, Basil Graves and W. C. Souter devoted themselves to demonstrating the clinical use of the corneal microscope and slit-lamp; the first named also demonstrated Hess's apparatus for the investigation of muscle paresis.

The General Business Meeting was held at 2.30 p.m., and this was followed by a meeting of British Ophthalmologists to receive the report of the Council of British Ophthalmologists recorded in the last number of this journal.

Sir Donald MacAlister, the Principal of the University, and Lady MacAlister held a Reception at which they kindly entertained the members attending the Congress.

On Friday evening Mr. J. GRAY CLEGG read a paper on "Central Scotoma in Anterior Uveitis."

Dr. IVY MCKENZIE read an interesting paper on the "Trigeminal Nerve as an integrating mechanism between the Nose and the Eyes" in which she discussed the anatomical distribution of the fifth nerve from the point of view of its functions as an integrating mechanism in the tissues to which it is related.

She said it cannot be too strongly emphasized that sensory nerves convey impulses from the centre to the periphery, and she gave instances in support of this contention. She said that in looking for the meaning of certain obscure and somewhat mild and transient nutritional disturbances one ought to look at the medullary conditions, whether toxic or due to increased irritability.

Sir JOHN PARSONS said he did not agree with the statement that the antidromic theory was fully proved, and spoke of a number of cases of excision of the gasserian ganglion that had come under his observation. He spoke of the relation between the trigeminal nerve and headache, which he said had all the characteristics of a primitive nerve response.

Dr. J. A. WILSON raised the question of sympathetic ophthalmia being possibly caused by impulses passing down a sensory nerve, and spoke of some recent work on herpes.

Mr. LESLIE PATON spoke of Head's classical experiments. He said that the whole elaborate structure of trophic impulses passing down the sensory fibres was built on very slender evidence and could not be accepted as definitely proved. He spoke on the question of the virus of herpes and pointed out that it was only in connection with the herpes febrilis type that the virus had been found, and that the work did not refer to herpes zoster.

Dr. IDA C. MANN read a paper on "Coloboma iridis and its Embryology." The subject was very clearly and exhaustively dealt with, and after mentioning the various theories the author gave her own explanation of the condition with embryological proofs. The lecture was illustrated by numerous drawings, which were shown on the screen.

PROFFESOR BRYCE complimented the author on the paper which he said was an answer to those who said that embryology had been worked out. He regarded the conclusions as to the development of coloboma as very reasonable.

Mr. TREACHER COLLINS mentioned two other ways in which congenital colobomata might be produced, viz., abnormal adhesion of the pupillary membrane to the lens capsule and, exceptionally, by the failure of or late separation of the lens from the back of the cornea.

Dr. HARRISON BUTLER gave a lucid demonstration illustrated by numerous drawings of his own on the "Anatomy of the Normal

Lens as Revealed by the Slit-Lamp." His slides showed the normal lens in many of its variations, the anterior Y, the posterior inverted Y, various fissures and the lens nuclei. He spoke of small areas of apparently cataractous changes which were present at all ages, and were as far as was known of no significance. He spoke of the literature at present available and entered a plea for simpler terms.

Mr. B. GRAVES read a paper which was also illustrated on the "Histology and Slit-Lamp Features of a Limbus Tumour," in which his object was to correlate the clinical, and histological features of the tumour, which was an innocent melanoma, with the appearances as revealed by the slit-lamp.

On Saturday, May 3, Dr. JOHN MARSHALL read a paper on "A Case of Persistent Hyaloid Artery." The patient was a child aged three years, and the eye was excised on account of increasing buphthalmos. Dr. Marshall illustrated his pathological findings with lantern slides, and raised the question of operative treatment.

Mr. TREACHER COLLINS and Sir JOHN PARSONS both spoke and also discussed the question of operation in these cases.

Dr. JOHN ROWAN'S paper on "Iridectomy for Congenital Cataract" gave rise to a very interesting discussion in which the following took part Messrs. BALLANTYNE, Sir ARNOLD LAWSON, J. GRAY CLEGG, CUNNINGHAM, JOHNSON TAYLOR, SYM, J. H. FISHER, Sir JOHN PARSONS, TREACHER COLLINS, KILLEN, PATON, CYRIL WALKER and J. A. WILSON.

Dr. G. F. ALEXANDER read two papers, one "On an Operation in Failure of Iridectomy for Glaucoma," in which be described a method he had used for reopening a corneal wound with the minimal risk of secondary infection. In the second paper on "Advantages of a Strong Solution of Atropin in Removal of Cataract" he advocated the use of a 5 per cent. solution of this drug one hour before operation.

Dr. S. SPENCE MEIGHAN read a paper on "Two Cases of Traumatic Vesicular Keratitis." He dwelt on the difficulty of diagnosis in the first instance, and the ineffectiveness of treatment in this condition. This paper also gave rise to a good discussion in which Messrs. BALLANTYNE, HEPBURN, AFFLECK GREEVES, CAMERON, JOHNSON TAYLOR, J. A. WILSON, LEVY, STEWART-BARRIE, Sir ARNOLD LAWSON and Mr. PATON took part.

Dr. W. B. INGLIS-POLLOCK read the concluding paper on the "Advantages of Early Division in Senile Cataract Operations," in which he advocated the division of the capsule with a Ziegler's knife, on the fifteenth day after the extraction of the cataract.

A very interesting and successful feature of the Congress was the scientific museum, which was housed in the spacious laboratory of the Department of Zoology, and included the following exhibits:

Prof. BRYCE :

Specimens illustrative of the Development and Anatomy of the Eye, from the Department of Anatomy.

Prof. GRAHAM KERR :

Microscopic Preparations illustrative of the Comparative Anatomy of the Eye, from the Department of Zoology. Demonstration of the Use of the Binocular Eyepiece with High-Power Microscopic Objectives.

Dr. R. A. HOUSTON, Lecturer in Physical Optics :

Diagrams illustrating the Results of the Glasgow Colour-Vision Survey.

Dr. A. MAITLAND RAMSAY and Dr. ALEX. GARROW :

Autochrome Plates of Diseases of the Eye.

Dr. JOHN ROWAN :

Autochrome Photographs of Diseases of the Eye.

Dr. LESLIE BUCHANAN :

Ophthalmological Instruments, Books, etc., of Local Historical interest, including many of Mackenzie's original instruments and books.

Dr. P. H. ADAMS :

Microscopic Preparations of (*a*) Secondary Carcinoma of the Choroid, (*b*) Siderosis Bulbi.

Mr. W. B. INGLIS POLLOCK :

(1) The Results in Rabbits of Removal of the Ciliary Ganglion, the Accessory Ganglia, and the Superior Cervical Sympathetic Ganglion.

(2) The Peripheral Nerve Plexus in the Iris after Removal of the Ciliary and Superior Cervical Sympathetic Ganglia.

Dr. A. J. BALLANTYNE :

Fundus Drawings. These excellent drawings were made by the exhibitor.

Dr. JOHN MARSHALL :

Pathological Specimens.

Dr. JOHN GILCHRIST :

Two Cases of Orbital Tumour. Specimens and Microscopical sections.

Mr. FISHER said, at the conclusion of the Congress, that those who had been visitors would desire to take this opportunity of expressing their thanks to the President and local members who had worked so hard to make the Congress a success. He proposed a vote of thanks to the University for their gracious reception and accommodation, and he especially wished that Professor Graham Kerr should be thanked for the hospitality he had extended in his department, and for the great interest he had taken in the meetings.

Drs. BALLANTYNE and WRIGHT THOMSON assisted the PRESIDENT

as local secretaries, and were responsible with him for the admirable arrangments throughout the Congress.

The annual dinner was held at the Central Station Hotel, Glasgow, on May 1. There were 69 present, the arrangements were admirable, and reflected great credit on the local secretaries.

ANNOTATIONS

Alternating Current Lighting and Eyestrain

We would draw the attention of readers to a letter from Mr. J. C. Elvy, Consulting Engineer, addressed to the Editor of the *Lancet*, which appears in the issue for April 26 last. Mr. Elvy thinks that there may be some connection between alternating current lighting and eyestrain. Personally, he finds himself more comfortable when working in his office with direct current lighting than when reading at home with alternating current lighting. He also says: "It would be interesting to hear the experience of surgeons when conducting delicate operations under these two different conditions—alternating versus direct—as with alternating it is possible to detect several images of bright metallic instruments especially when these are in motion, similar to "cinematograph" action. The "cinematograph" effect is most pronounced in the low wattage "Neon" nightlight bulbs when used on an alternating current circuit. Perhaps ophthalmic surgeons could throw some light on the apparent increase in the use of spectacles in certain areas." The Editor remarks that it is undoubtedly the case that with a cycle of alternation of less than 25 there is a perceptible flicker which is trying to the eyes. He also remarks that while, as he understands, there are 25-cycle plants which supply lighting as well as power, there is no supply of alternating current at less than 50 alternations for lighting. Even at this speed there may be a slight cyclic variation in the light, especially from the low-power high-voltage metal filament incandescent lamp, in which the mass of the filament, and, therefore, the stored heat energy is very low. The Editor of the *Lancet* recommends the point as one which ophthalmic surgeons might consider.

It may be of interest to record an instance in which a factory was lighted by alternating current. In one of the sheds there were several circular saws and the management had deemed it necessary to transform the current supplying this shed to a constant current in order to avoid risk of injury; because if the rate of rotation of the saws was such that the movement of the teeth was in phase with the alternation of the current, the saw would appear to be stationary.

Toxic Effects following the Use of Local Anaesthetics

In the April number, page 172, we published an annotation on the dangers of butyn as a local anaesthetic. The subject is of such importance that we do not hesitate to return to it in view of the findings of the Special Committee of the American Medical Association appointed to investigate the toxic effects following the use of local anaesthetics, and organized by Dr. Mayer of New York, which has now issued its report in the Journal of the American Medical Association for March 25, 1924. With the exception of one case in which convulsions followed the use of cocain no serious consequences were noted as having occurred in ophthalmic practice. The report deals with no less than forty-three deaths, in two of which the Committee concluded that the local anaesthetic was only contributory to the cause of death. Five deaths followed the use of butyn alone or in combination with cocain. Two of these deaths followed within a few minutes after the application of a 5 per cent. solution of butyn to the nose. They point out that the use of butyn is still in the experimental stage and that caution in its use is indicated. The phenomenon of synergism in the use of local anaesthetics is apt to be overlooked, and some suggestive experiments by Ross and Gold on the action of epinephrin with cocain on the cat showed that the toxicity of the latter anaesthetic was greatly increased by the addition of small doses of epinephrin. The safest local anaesthetic for injection purposes appeared to be procain (novocain). The report contains a useful summary and a table of recommendations. In the latter they advise that cocain should not be injected into the subcutaneous tissue nor should it be used in the eye in strengths greater than 5 per cent. Epinephrin serves a valuable purpose in causing a bloodless field and in delaying the absorption of local anaesthetics, especially procain, but the addition of epinephrin in amounts of 1 mg. or more to an injection of cocain often results in a greater degree of toxicity than would arise from cocain alone when rapid absorption takes place; hence the use of larger doses of epinephrin with cocain is deemed unsafe, and epinephrin should not be used in greater concentration than 1 : 10,000 and of this not more than ten minims with cocain. Somewhat larger amounts of epinephrin may be used with solutions of procain, but not more than 1 mg. of epinephrin should be used, and even this dose may be unsafe in patients suffering with hyperthyroidism.

The report deals also at some length with the best antidotal measures and gives an analysis of the fatal cases investigated. It should be read in the original by all medical men who use and possibly sometimes abuse local anaesthetics.

ABSTRACTS

I.—OCULAR MUSCLES AND NUCLEI

(1) **Hairi, H. (Geneva).—The various forms of binocular diplopia. (Différentes formes de diplopies binoculaires.)** *Rev. Gén. d'Ophtal.*, June, 1921.

(1) **Hairi** has attempted to gather into a single scheme the various possibilities of position of the false image—or, as he prefers to call it, the paramacular image—in cases where not only one, but more than one ocular muscle is affected by paralysis or paresis. He confines his attention meantime to the straightforward position of the eyes. The article is quite impossible to render intelligible in an abstract, so that reference to the original is essential. The schema appended shows the positions of the images in 44 different sets of circumstances and may perhaps be quite useful in the elucidation of difficult cases.

ERNEST THOMSON.

(2) **Bartels (Dortmund).—Abducens, trochlear, and oculo-motor nuclei, which are not associated with eye movements. (Abduzens, Trochlearis, und Oculomotoriuskerne, die nicht der Augenbewegungen dienen.)** *Bericht der Deutsch. Ophthal. Gesell.*, Jena, 1922.

(2) **Bartels.** A study of the movements of the eyes in the vertebrata shows that birds exhibit the greatest divergence from the normal. On the one hand certain of them, divers, cormorants, and sea-gulls, can move their eyes in all directions, together or independently, whereas the owls possess no movement at all. The telescopic eye of the owl is firmly attached to the bony margin of the orbit, and in this respect this species is unique among the vertebrata. It is remarkable that the owl possesses all the normal eye muscles, both recti and obliques. The owl's eye is tubular with a waist-like constriction. The posterior end, the fundus, takes the form of a slightly concave disc, which is attached to the so-called sclerotic margin. The six muscles, which are but a few millimetres long, arise from the optic foramen, and have a tendinous attachment to the sclerotic ring. They are therefore attached to two fixed points. Only two muscles can be useful for movement: the nictitating muscle, which runs in a pouch in the pyramidal muscle, and the lid elevator. The owl's eye also has a mobile pupil and a restricted accommodation. The usual nerves and nuclei are present. Bartels compares the

nuclei of the Stormy Petrel with that of the Uhu. The oculo-motor nucleus in the Uhu is large, that of the Petrel small, and yet one moves its eyes in all directions whereas the other has a fixed eye. He concludes that the nuclei in the owls must have a function unconnected with the eyes and entirely different from that which they serve in all other vertebrata. This anomaly makes him wonder whether our ideas regarding the localization of function in the brain will not require modification.

We confess that we are unable to see why the fact that the apparatus for moving the eye is present in the owl, whose eye cannot move, proves that the nerves and nuclei have other functions. The muscles obviously have no function but are merely vestigial remnants of muscles which are useful in other vertebrates. Why then may we not assume that the nuclei also have no function whatever?

T. HARRISON BUTLER.

(3) **Merle and Frogé (Amiens).—Transitory diplopia after lumbar puncture.** *Annal. d'Ocul.*, Vol. CLX, January, 1923.

(3) **Pierre Merle and Frogé** had occasion to do a lumbar puncture in a woman, 42 years of age, who was obviously very neurotic, but in whom it was desired to establish the absence of organic nerve disease as she had some bladder trouble, and the pupils were a little sluggish to light. The fluid gave albumen 0.65, sugar 0.40, lymphocytosis none, Bordet-Wassermann negative. Soon after the puncture she vomited several times, complained of very severe headache, could not sit up in bed for vertigo, could not eat, remained agitated and anxious. On the sixth day after the puncture she complained of diplopia, and both external recti were found paralysed. The diplopia was all over the field but not on near work. The pupils reacted less quickly to light than on convergence; fields and fundi normal. The diplopia lasted eight days and disappeared completely along with the other bad symptoms. No treatment was used except one injection of enesol, which agitated her so much that no more could be used.

The authors dismiss hysteria as a cause, and in connection with the possibility of any intracranial decompression produced by the lumbar puncture they say this is not known as a cause of diplopia, and that, moreover, in the present case there was no pre-existing hypertension. They cite Lagrange and Pesmé's case of ocular paralysis after spinal anaesthesia in a luetic case, predisposed to such, but suggest that as their patient had not had any fluid injected the two cases could not be compared. They seem inclined to offer vaso-motor troubles comparable to those met with in ophthalmoplegic migraine as an explanation, and put aside preataxic

diplopia owing to the findings in the fluid, with the remark that time will tell. It is to be noted, however, that paralysis of an external rectus is not unknown even in spinal anaesthesia cases where the cerebro-spinal fluid is drawn into the syringe already charged with the powdered anaesthetic, and only the removed amount, and sometimes not quite all of that, re-injected when this has dissolved. The late development of the diplopia, six days after the lumbar puncture, and the rapid cure, eight days later, are not quite in agreement with the usual findings described after lumbar anaesthesia and some other explanation may occur later, which, it is to be hoped, the authors will duly publish to supplement their very rare case. No reference is made to the size of the needle used nor as to any special difficulty in the actual puncture, while the colloidal gold reaction is not mentioned as having been done.

W. C. SOUTER.

(4) **Feiling, A. (London). — Ocular Palsies.** *Brit. Med. Jl.*, February 9, 1924.

(4) **Feiling's** paper is abridged from an article read before the Southampton Medical Society on November 7, 1923. It is based on 45 cases of ocular paralysis in his own practice. From the aetiological standpoint the cases are classified as follow:

Syphilis (including tabes; no case of G.P.I. came under observation) 15 cases, or 33.3 per cent.; cerebral tumours, 5 cases; encephalitis lethargica, 6 cases; sinus infections, 5 cases; ear disease, 2 cases; trauma, 1 case; vascular lesions, 3 cases; disseminated sclerosis, 2 cases; migraine, 1 case; post-diphtheritic neuritis, 1 case; congenital ophthalmoplegia, 1 case. Of doubtful aetiology, 3 cases. The more interesting of the cases are briefly described under the above headings. Of particular interest are the five cases of ocular palsy due to nasal sinus infection. After radical nasal treatment, three of the cases were cured, one was vastly improved, and in one case operation was refused.

Feiling recounts four definite syndromes; those of Weber, Benedickt, Foville, and Millard-Gubler, and ends with some interesting remarks upon the Argyll Robertson pupil reaction. This reaction has in the past been held to be pathognomonic of syphilis of the nervous system. "This view," says Feiling, "cannot be upheld" in view of the work of Kinnier Wilson and others. A reference to Wilson's paper in the *Journal of Neurology and Psychopathology* (Vol. II, No. 5, p. 1) is given in which the author mentions the following conditions where the Argyll Robertson reaction has been observed: epidemic encephalitis; disseminated sclerosis; cerebral tumours in the vicinity of the third

ventricle, aqueduct, or anterior corpora quadrigemina; syringomyelia or syringobulbia; chronic alcoholism; traumatic cases. Feiling's paper is one that will well repay perusal.

R.R.J.

(5) **Toussaint.—Traumatic paralysis of the left superior oblique.** *Arch. med. belges.*, Vol. LXXVI, p. 954, 1923.

(5) **Toussaint** reports a case of a soldier who received a blow over the root of the nose, and the under part of the left superciliary ridge from a kick by a horse. Ten days later, the wound having healed without any complications, he complained of diplopia, and a paresis of the left superior oblique was discovered. Fifteen days later no sign of paresis could be elicited. The question of injury to the fourth nerve in the orbit or direct damage of the muscle itself is discussed, and Toussaint considers that in this case either the pulley was detached from its insertion or that the synovial membrane so reacted to the injury that the normal functioning of the tendon in it was disturbed. This case seems to be analogous to those frequently recorded where a temporary diplopia follows operation on the frontal sinus.

O. GAYER MORGAN.

II.—OPTIC NERVE AND TRACTS

(1) **Lillie, W. J. (Rochester, U.S.A.)—Ocular phenomena produced by intracranial lesions involving the optic tracts near the chiasm.** *Jl. of the Amer. Med. Assoc.*, Vol. LXXXI, No. 21, p. 1765, 1923.

(1) This paper is an abstract of **Lillie's** thesis for the degree of Master of Science in Ophthalmology, which is to be published in full in the transactions of the Section on Ophthalmology of the American Medical Association.

The lesions dealt with are divided into four groups: (1) pituitary tumours, 46 cases; (2) intracranial tumours not of pituitary origin affecting the chiasm, 12 cases; (3) nasopharyngeal tumours affecting the chiasm, 4 cases; (4) syphilitic basal meningitis affecting the chiasm, 2 cases.

Under the heading of "ophthalmoscopic changes" are given: (1) changes in visual acuity; (2) changes in the optic disc; (3) changes in the perimetric field; (4) ocular motor changes.

Practically all the patients had impaired vision, not improved by lenses. When operation was undertaken no appreciable improvement followed either in acuity or in the field if "definite simple optic atrophy" was present, a condition regarded as distinct and distinguishable from "pallor without loss of substance." When the latter condition is present the associated loss of function is "purely a 'block,'" and the prognosis as regards recovery of vision after operation is good.

The field defects found were: bitemporal hemianopia, 32 cases; homonymous hemianopia, 7 cases; temporal hemianopia with blindness of the other eye, 10 cases; quadrant defects, 4 cases; scotomatous defects, 12 cases. In four cases the fields were normal. Ocular motor changes were less frequent except in the naso-pharyngeal group. The sixth nerve was most commonly affected, but anyone or all of the ocular nerves might be involved. The author concludes that the nasopharynx should always be examined when an intracranial lesion affecting the chiasm is suspected, and that the origin of lesions affecting the chiasm cannot be definitely determined from ophthalmological examination.

H. M. TRAQUAIR.

(2) **Hughes, W. E. (St. Louis).—A cystic tumour of the hypophysis cerebri, with optic nerve atrophy.** *Amer. Jl. of Ophthal.*, May, 1917.

(2) The case reported by **Hughes** is incomplete in so far as only the clinical symptoms are mentioned. The article ends very abruptly, suggestively so in fact.

The patient was a lawyer, aged 33 years. Following a severe mental shock he noticed a numb tingling sensation in the occiput followed by a terrific headache radiating from the occiput through the temporal region. This recurred at irregular intervals. A few months later he noticed that if he stooped over in a certain position he could not read the titles of the books in the lower shelf of his library. Vision would flicker and faint red blurs would appear upon the page of whatever he was reading. About six months later vision of the left eye suddenly failed until the patient could barely distinguish forms. He had a desire to sleep day and night. After two months vision returned in the left eye and failed in the right. "Patient consulted various physicians who, he said, told him various things." Three years later headaches returned and centred in the frontal region, radiating backwards with the sensation of an iron band round the skull. At this time the V.A. of right eye was equal to detection of large shadows, of the left eye 6/40. Pupils dilated, right 5 mm., left 4 mm. Only consensual reaction in right, while in the left the direct was sluggish. Both

nerves atrophic. As to the visual fields, there was bitemporal hemianopsia, but the perimetric readings appear to have been only imperfectly taken. The author does not discuss the case, nor does he show the steps of the argument leading to the diagnosis, which latter is stated only in the title.

ERNEST THOMSON.

(3) **Kershner, S. H. (Major, U.S. Army).—Secondary optic atrophy due to "Gassing."** *Amer. Jl. of Ophthal.*, Series 3, Vol. I, No. 3, March, 1918.

(3) The case of "gassing" resulting in optic atrophy, partial of one eye and fairly severe in the other, is reported because up to the time of writing the remote effects of gas poisoning had been little studied in America. In the final paragraphs of the article the author speculates as to whether the secondary atrophy follows neuritis resulting from gas ethmoiditis as suggested by Finch (*Lancet*, No. 6, 1915), or is caused by the effects of the gas on the vaso-motor system, or is due to direct blood changes. The exact cause "is of less importance than the actual results; which we will have to face if degeneration of the visual apparatus proves a common end result of gas toxaemia." A chart of the visual field of the better eye accompanies the article.

ERNEST THOMSON.

(4) **Terrien, F.—Bilateral optic atrophy and antityphoid vaccination. (Atrophie optique bilatérale et vaccination antityphique.)** *Arch. d'Ophtal.*, February, 1923.

(4) During the late war several reports were published of ocular lesions consecutive to antityphoid inoculation. The dependence of these lesions on the inoculation was difficult to establish and in some instances the evidence was quite inconclusive. In others it seemed clear that the unfortunate sequelae of inoculation were due to want of care at the time the injection was given.

The lesions most frequently observed were corneal: affections of the deeper structures, such as irido-cyclitis, oculo-motor paralysis, etc., were less frequent and their dependence on the inoculation was not always obvious. The case now published by Terrien is one in which the evidence supports the conclusion that the optic nerve atrophy was a direct result of anti-typhoid inoculation, and in which it was difficult to explain the lesions in any other way.

The patient, a man of 43, was admited to the military hospital at Verdun in February, 1915. A few hours after the injection of antityphoid vaccine his sight failed rapidly, so that the next day he was quite blind and remained so for four days. Sight then

began to return and continued to improve slowly but incompletely. He was then examined by Dr. Bailliart, who entered on the man's record sheet the diagnosis: "optic atrophy in process of evolution." The ophthalmoscopic conditions were described by him as follow: R. papilla whitish with ill-defined margins; pupillary light reflex normal; V. = 0.4 barely; visual field restricted especially for colours; L. papilla greyish, most noticeably in the lower temporal quadrant; pupillary light reflex normal; V. = 0.4 barely; visual field much contracted, especially for colours.

When seen by Terrien in December, 1922, in reference to war disability, the man's vision was less than 1/40 in each eye, the fields of vision were greatly contracted. The optic papillae were white with irregular edges and white lines along some of the retinal vessels. The pupils were moderately dilated and reacted very imperfectly to light. No signs of tabes were discoverable and the Wassermann reaction was negative.

In the author's opinion the evidence that the optic neuritis and subsequent atrophy were induced by the antityphoid inoculation is reliable. The onset of visual failure within a few hours of the injection supports this view. Certainly the case is worthy of record.

J. B. LAWFORD.

(5) **Cutler, Colman W. (New York).—Disease of the optic nerve and its relation to the posterior nasal sinuses. Report of four cases showing the uncertainty of the diagnosis.** *Arch. of Ophth.*, July, 1923.

(5) In consequence of the publication of several striking cases of retrobulbar neuritis completely cured by operations on the accessory sinuses, there has arisen an undue optimism with regard to treatment of cases simulating this disease. **Colman Cutler** reports four cases, where the diagnosis at first was difficult or impossible.

Case 1. Miss A.M.D., aged 45, showed a loss of vision in the R.E. to 20/50, with a retrobulbar type of pupil and enlarged blind spots. A central scotoma was not present, but a paracentral scotoma for red developed late in the course of the disease. There was a temporary improvement after intranasal treatment. The patient died in a year, and at the autopsy was found to have an aneurysm of the circle of Willis. There was no definite papilloedema.

Case 2. Presented no definite signs of retrobulbar neuritis, but there was headache, and inability to concentrate. Vision was normal, also fields, the discs were congested. Diagnosis lethargic

encephalitis, because of increasing sleepiness, and drooping of lids.

Case 3. A school girl, diet irregular, digestion disordered. Vision R. and L. with correction 20/30; field shows concentric contraction, no central or paracentral scotoma. No sign of focal or other infection. Condition cleared up, when diet was regulated and elimination improved.

Case 4. Miss A.P.M., aged 23. When first seen had P.L. only in R.E., with wide immobile dilated pupil and normal fundus. L.E. normal. There was an area of complete analgesia in the right super-orbital region. She developed profound hysteria. The posterior ethmoidal cells were opened, the left middle turbinate was removed, and in two months vision and pupil were normal, though the hysteria persisted. The author then discusses at some length retrobulbar neuritis and sinus diseases. The following are a few of the points he emphasizes:

1. Many cases with obstructed nares and recurrent colds show enlargement of the blind spot, especially for colours. Nasal treatment is advocated, but operation is performed only if the scotoma increases or other signs appear.
2. Enlargement of the blind spot to colours is a frequent precursor of true peri-papillary scotoma, and, in the absence of fundus changes, is most frequently due to retrobulbar neuritis with sinusitis.
3. Sinusitis causes eye symptoms in two ways:
   (a) By direct extension from a posterior ethmoidal or sphenoidal cell.
   (b) As a toxic manifestation when the anterior sinuses are affected.
4. Among other early signs of retrobulbar neuritis, there are to be noted insufficiency of convergence and accommodation.

F. A. WILLIAMSON-NOBLE.

(6) **Van Duyse (Ghent).—Peridural sarcoma; invasion of the vaginal space of the optic nerve.** ***Remarks on intra- and extra-dural tumours and intra-vaginal metastasis.*** **(Sarcome péridural avec invasion de l'espace vaginal du nerf optique.)** ***Quelques considérations sur les tumeurs intra- et extra-durales et la métastase intravaginale éventuelle.)*** *Arch. d'Ophtal.*, July, 1923.

(6) This is a long and interesting communication based upon a case of peridural sarcoma of very slow growth, in which the tumour cells found their way through the dural sheath of the nerve and formed islands of new growth in the intersheath space. The patient, a female aged 31, had been under observation from August,

1915, at which date the first subjective symptoms (diplopia, and discomfort in the region of the left eye) appeared, until the end of December, 1922, when the tumour was removed. The clinical features of the case are given in detail; a diagnosis of tumour of the optic nerve was made only after a prolonged examination, including a quantitative and qualitative analysis of the blood, which revealed some excess of lymphocytes, diminution in the number of red blood corpuscles, and noticeable degeneration of them.

The growth was removed and an attempt made to preserve the eyeball, but it was subsequently destroyed by purulent keratitis. A very full description of the histological characters of the tumour is given and illustrated by several excellent micro-photographs.

The new growth proved to be a sarcoma of mixed type; the predominating element was a cell with a large rounded nucleus, with fairly abundant protoplasm. In parts the cells were fusiform. Mucous degeneration was noticeable in some areas, in others the growth showed an alveolar structure suggestive of carcinoma.

The author refers briefly to most of the published reports of peridural sarcoma. The result of **van Duyse's** study of his case, clinically and pathologically, is given in the following series of "conclusions":

(1) The peridural sarcoma under observation belongs to a mixed type composed of round and fusiform cells, with a slightly developed tendency to abandon the embryonic type for that of *sarcoma fibromatosus*.

(2) Its characteristics are those of a locally malignant tumour of slow development.

(3) The extension of the peridural tumour through the dural sheath has been favoured by the lacunae caused in the latter by oedema of the extra-dural orbital tissues.

(4) The optic nerve has undergone an atrophy, apparently simple in character although the pial and arachnoid sheaths were adherent and thickened.

(5) In the enlarged vaginal space clustered and free sarcoma cells were visible. Columns of neoplastic cells traversed the dural sheath, and projected into the subdural space. Thus were formed secondary plaques of new growth on the external surface of the arachnoid sheath, easily distinguishable from endothelial proliferations arising from perineuritis.

(6) The existence of lymphatic clefts forming a communication between the intervaginal space and the peridural tissue could not be determined. The passage of sarcomatous columns through the dural sheath would be greatly facilitated by the formation of oedematous spaces, or by the enlargement of fine transverse clefts

in connection with the longitudinal clefts described and figured by Axel Key and Retzius.

(7) The migration of cells from an extra-dural tumour (which have penetrated the dural sheath and gained access to the inter-sheath space of the optic nerve) into the cerebral meninges, although possible, has not yet been demonstrated.

J. B. LAWFORD.

(7) **Ingham, S. D., M.D., and Lyster, T. C., M.D.—Abnormalities in the visual fields.** *Jl. of Amer. Med. Assoc.*, January, 1924.

(7) **Ingham and Lyster** in discussing the methods of obtaining screen records find that accuracy depends on five fundamental requirements: (1) the maintenance of binocular fixation; (2) the practical elimination of fatigue; (3) uniform illumination; (4) a large field for the recording of observations; and (5) invisibility of the record to the patient during the examination.

In order to carry out these requirements they have devised an instrument on the principle of Lloyd's Stereocampimeter. The curtain of the screen is made of grey cotton cloth measuring 120 × 180 cm., mounted on a frame or stand. The screen is easily removed and another fixed, a fresh one being used for each examination. A vertical triangular partition, perpendicular to the screen, separates the fields of the two eyes. A chin-rest steadies the head of the patient, with the eyes 55 cms. from the centre of the screen and the glabella touching the partition. Two fixation points are attached to the screen 5 cm. on each side of the partition and 10 cm. from each other. Stereoscopic vision is obtained by the use of prisms with their bases outwards and they are rotated if necessary to obtain fusion of the fixation points. The visual field of each eye is thus unrestricted except to the nasal side where it is limited to 5° from the fixation point. Although it is impossible to examine the nasal fields by using binocular fixation, this can be done by removing the partition and covering the eye not examined. The fields are plotted with chalk on the reverse side of the screen, invisible to the patient. The translucence of the cloth makes it possible to see clearly the shadow of the test object from the other side of the screen. When finished the chart is photographed for permanent record. After washing the curtains are ready for further use.

The field is large enough for reasonably accurate charting, and within the 20° circle 1° of the visual angle is approximately represented by 1 cm. on the screen. (10° = 9.7 cm.; 20° = 20 cm.)

E. R. CHAMBERS.

III.—INTERSTITIAL KERATITIS

(1) **Lees, David.—Interstitial keratitis treated by bismuth salts.** *Trans. Med.-Chir. Soc. of Edin.*, Vol. CIII., 1923-4.

(1) **Lees** admits that arseno-benzol preparations are still the most potent drugs for the treatment of syphilis, particularly when combined with the use of mercury and iodides. Certain patients, however, cannot tolerate these drugs, as exemplified by three cases of interstitial keratitis which he describes. In one case arsenical dermatitis and severe illness followed the administration of novarsenobillon. In another, a severe erythema and slight jaundice occurred. In the third, the contra-indication was an increasing albuminuria and oxaluria.

Lees claimed as the result of treatment with bismuth, alone or in combination with arsenic preparations, of 150 cases of all stages of specific infection, that the intramuscular administration of bismuth salts is more effective than that of mercury but probably less so than that of salvarsan derivatives.

Local pain at the site of injection is rare. Dermatitis and stomatitis are uncommon, and can be prevented by careful dental hygiene. Nephritis and colitis have been reported but are rare, as also headaches, depression or other signs of intolerance.

The preparation recommended by Lees and used by him in the cases of interstitial keratitis reported, is a cream prepared by Burroughs, Wellcome and Company, of precipitated metallic bismuth suspended in an ereocamph basis. It contains 0.15 grm. of the metal in each cubic centimetre.

Over 100 cases were treated by this means, with no signs of intolerance apart from an occasional blue line on the gums.

For an adult, the first dose is 2 cubic centimetres. This is repeated in from five to seven days, and the dose increased to 3 or 4.5 cubic centimetres. Up to 20 or 30 cubic centimetres in all are usually required.

The technique is similar to that employed for intragluteal injection of mercury preparations. It is necessary to heat the preparation, which is then injected slowly with a hypodermic syringe through a needle of fairly large bore. Care should be taken to see that no blood oozes through the needle after its insertion—indicating injury to a vein.

HUMPHREY NEAME.

(2) **Duverger and Lampert.—Interstitial keratitis of traumatic origin.** *Arch. d'Ophtal.*, Vol. XLI, p. 12, January, 1924.

(2) **Duverger and Lampert** report three cases of parenchymatous keratitis, the result of injury. In one, a small foreign

body, in another by several small pieces of coal, and in the third an abrasion by a branch of tree. In each case, there was an appearance of deep opacity in the cornea, in addition to superficial disturbance. The vision of the first after six months returned to normal, of the second after fourteen months to 1/10, of the third after fourteen months to 1/5.

Cases of interstitial opacity in the cornea covering contusion of the globe are not included in this class of case, only those in which there is a deep keratitis, persistent and with slow recovery, covering a wound however small it may be. It is sufficient for a lesion to occur alone; after a few days, it developes the appearance of foldings of Descemet's membrane with a ground glass appearance of the deeper layers. This slight opacity advances gradually into the middle layers of the cornea and produces an appearance similar to that in interstitial keratitis. Pain, headache, photophobia follow : interference with vision and sometimes cloudiness of the aqueous humor, hypopyon and slight iritis. The opacity of the cornea increases mainly in the deeper layers, and on the whole the central layers remain moderately clear. An important development is the loss of sensibility of the cornea with appearance of bullae of the epithelium; surface irregularities and filaments and loss of epithelial substance may follow.

Relief is obtainable by means of a tarsorrhaphy, which in the course of from three to six months, allows complete healing of the epithelium and entire disappearance of irritation and pain.

During this long continued trouble, there is an absence of vascularization of the cornea. Deep corneal opacity remains and a localized superficial opacity corresponding with the injury. During the course of the disease, an important point is the variability of the condition, so that there is frequently an appearance as of recovery and then relapse.

The two most important points of differentiation between this condition and interstitial keratitis of syphilitic origin are : (1) that the sensibility of the cornea is impaired; (2) the absence of deep blood-vessels. Years after the subsidence of the active stage in interstitial keratitis of non-traumatic origin, the deep vessels can be detected, by means of the corneal microscope and the slit-lamp, and within them the red globules of blood corpuscles can be seen.

HUMPHREY NEAME.

(3) **Lundsgaard, K. K. K. — Acute diffuse parenchymatous keratitis as a complication in parotitis epidemica.** *Acta Ophthal.*, Vol. I, p. 2, 1924.

(3) **Lundsgaard** records a case of unilateral acute parenchymatous keratitis occurring in a man, aged 37, during the second week

of an attack of typical epidemic parotitis with involvement of the testis. The cornea showed diffuse cloudiness and roughness of its surface, and greyish interlacing streaks situated in its middle and anterior layers. There was no vascularization and no iritis, and complete recovery took place in twelve days with no treatment except the use of atropin. He mentions several cases previously described and distinguishes between this type, in which keratitis is the main feature, and cases of irido-cyclitis associated with chronic swelling of the parotid—the *febris uveo-parotidea* of Heerfordt which is thought by Gjessing to be tuberculous.

E. H. CAMERON.

(4) **Jones, C. P.—Interstitial keratitis due to focal infection.** *Amer. Jl. of Ophthal.*, June, 1923.

(4) **Jones** records an interesting case of typical interstitial keratitis in a well grown boy of 16 years of age; the boy was the youngest of six children, the parents were healthy and the mother had had no miscarriages; the Wassermann reaction was negative in both parents and in the child.

The boy had a severe attack of interstitial keratitis in each eye which left him with opaque cornea, gross deep injection, and vision reduced to inability to count fingers at a distance of three feet with either eye; in this condition he came under the care of Jones; antisyphilitic remedies had already been exhibited and indeed pushed. Jones found that the tonsils showed pus in the crypts, and an X-ray examination discovered the presence of nine apical abscesses. The affected teeth were removed as well as the diseased tonsils and the boy made an uninterrupted recovery, and at the end of seven months vision of 20/20 was recorded.

Bacteriological examination of the pus from the teeth and tonsils showed the presence of the following microbes; streptococcus haemolyticus (predominating) micrococcus catarrhalis and pneumococcus; the last two varieties were not much in evidence.

R.R.J.

(5) **De Courcy, T. L., and Mather, M.B. (Liverpool).—X-ray treatment of interstitial keratitis.** *Brit. Med. Jl.*, January 5, 1924.

(5) **De Courcy** and **Mather** record five cases of interstitial keratitis and one of ulceration treated with X-rays with marked improvement; the clinical details are not abstracted here for the simple reason that in dealing with so common a disease it is unnecessary to do so, but it is worth while to give a note of the technique employed in order that others may give this method of treatment a trial.

The authors' technique is as follows: "The patient lies on his back on the couch, the head being firmly fixed with sandbags which are brought up level with the forehead on each side. A rectangular piece of thick felt about 14 inches by 6 inches, to which two layers of lead foil have been stitched, is taken, and in this are cut two circular windows, approximately the size of the eyeballs, and at the necessary distance apart. This pad is accurately centred, felt side down, over the eyes and held in position by means of additional sandbags. The tube stand, with a lead glass speculum just large enough to include the eyes, is placed in position so that the distance between the anti-cathode and the eye is 8 inches. A 7-inch gas tube is used, through which we pass a current of 1 milliampère backing up a 6-inch spark-gap, the rays being filtered through 0.5 mm. of aluminium and one layer of felt. The duration of each treatment is six minutes. A treatment is given every seven days, and usually five or six suffice." The authors have been led to adopt this "small dose" method with little filtration for the reason that the lesion treated is superficial. They wish to give a stimulating or exciting dose and with a small dose such as they have described there is no risk of damage to the surrounding tissues. Five of the cases were apparently of syphilitic origin, recent and of old standing, the last case was one of Mooren's ulcer, and the relief from discharge and active ulceration was at once noticeable, no effect was expected on the formation of scar tissue in this case, and none took place, but if for no other reason this treatment may well be given a trial in cases of obstinate corneal ulceration, for a Mooren's ulcer is notorious in resisting all forms of treatment.

R.R.J.

IV.—MISCELLANEOUS

(1) **Lundsgaard, Dr. K. K. K. (Copenhagen).—The value of the Finsen treatment for the complications of lupus vulgaris in the eyes. (Die Bedeutung der Finsenbehandlung für Komplikationen bei Lupus vulgaris der Augen.)** *Klin. Monatsbl. f. Augenheilk.*, January-February, 1922.

(1) **Lundsgaard** in this paper, after referring to the work of Dr. Chr. F. Bentzen, who was the first Ophthalmic Surgeon to the Finsen Light Institution and published his observations on 1000 lupus cases in the *Nordisk Tidskrift for Therapie*, 1903, gives an account of the conditions met with in the 1862 patients who came under treatment from the beginning of 1904 to the end of 1920. The most important and most typical lupus affections were

disease of the lacrymal apparatus, keratitis and cicatricial ectropion. Females were more often affected than males (520 males to 1342 females). The light treatment did not prove of much value in disease of the lacrymal apparatus. Lundsgaard found only 4.3 per cent. of keratitis as compared with the 14.1 per cent. found by Bentzen in the earlier period. He readily admits the extreme difficulty of differentiating phlyctenular and tuberculous affections of the cornea and suggests that the corneal microscope with the slit lamp may prove of some service.

In no case did any serious injurious effect follow the use of the light. The only complications observed were a certain amount of electric conjunctivitis and some marked oedema of the lids. In some cases quoted the results were extremely successful after the failure of other treatment.

From the results obtained, Lundsgaard feels confident that eye complications of lupus can be largely prevented if this disease comes under treatment at the right time with the Finsen light.

E.E.H.

(2) **Lossouarn, Dr. (Pekin).—Study of ocular lesions produced by Chinese powders. (Étude des lésions produites par les poudres chinoises.)** *La Clin. Ophtal.*, June, 1923.

(2) **Lossouarn,** while working at the Pei Yang ophthalmic clinic, observed a large number of cases of various ocular diseases produced by the use of certain powders that are largely used by the Chinese. These powders vary in colour but are mainly composed of calcium carbonate, probably obtained from powdered oyster shell. They are mostly flavoured with menthol, and apparently do not differ much in composition. Lossouarn finds that two distinct types of lesion follow the use of these powders. One he calls irritative and the other sluggish. Rarely the two forms are superposed. In the irritative type conjunctival congestion is marked; corneal lesions such as ulceration and interstitial keratitis follow. Iritis may follow and corneal abscess leading to loss of the eye. The evolution of this form is slow. In the torpid form there is but little congestion. The earliest change is usually found near the caruncle and consists in a deep buff discoloration of the conjunctiva. Even round the ulcers when they form there is little inflammatory reaction.

Lossouarn states that, inasmuch as the officials themselves make use of these powders, legislation to forbid their sale is not probable. The real remedy lies in a better education of the public, and the various missions can assist this work. He says nothing of the routine scraping of the eyelids by the barbers with unclean bits of wood which, in the reviewer's time in China, was responsible for the fact that it was rare to find a Chinaman without trachoma.

E.E.H.

(3) **Jacovides (Alexandria).—Defects of vision following injections of large doses of emetine. (Troubles visuels à la suite d'injections fortes d'émétine.)** *Arch. d'Ophtal.*, Nov., 1923.

(3) **Jacovides** reports his findings in 300 cases of dysentery treated with emetine. During the War 212 cases of dysentery were seen, and on arrival at Alexandria 22 per cent. of these had eye symptoms. These comprised:—Lacrymation and slight congestion of the bulbar conjunctiva, photophobia and diminution of vision in some cases down to perception of light. The majority showed mydriasis with pupils inactive to light or convergence, loss of field especially on the temporal side, and a central scotoma. There was also circumorbital pain. Ophthalmoscopically there was at first hyperaemia of the retina and optic nerve, followed in a few days by some retinal ischaemia with slight pallor of the disc, and a return to normal within 15-20 days.

With regard to age and doses:—90 per cent. of the patients whose ages were between 15 and 25 showed no symptoms provided the dose did not exceed 5-6 ctg. in 24 hours, and in the remaining 10 per cent. the symptoms cleared up 3 days after stopping the emetine.

Over 30 years of age the percentage of cases affected with this dosage rose to 25.

Ametropes seemed more liable to suffer than emmetropes, while tobacco and alcohol increased the susceptibility to a very marked degree. Susceptibility was diminished by a previous course of emetine, and a sort of immunity developed, 8 ctg. a day being required to produce the same proportion of affected cases.

In summing up the author compares the action of emetine with that of tobacco and alcohol with the difference, that the manifestations appear much more quickly and that on removal of the cause they disappear without leaving any appreciable organic damage.

F. A. WILLIAMSON-NOBLE.

BOOK NOTICES

Ophthalmo-Optical Manual. BY WILLIAM SWAINE, B.Sc., Lecturer in Physics. 152 pp. Published by the Hatton Press, Ltd., 173, Fleet Street. *1923.*

The preface states that this book is intended to be elementary, practical and non-mathematical, to suit the requirements of student workers in ophthalmic optics. This intention is so conscientiously

carried out that there is not a formula in the book, and so it cannot meet the requirements of these students in the examination room.

In the first fifty pages the elementary action of spherical, spherocylindrical lenses and prisms is rendered familiar by simple experiments made with a box of trial lenses. This is excellent, and it is followed by an explanation of accommodation, defects of muscle balance, and errors of refraction. Short chapters are also given on retinoscopy, ophthalmoscopy and spectacle frames, and the book concludes with fifteen tables, several of which may prove useful.

A number of interesting facts are mentioned which are not to be found in the current standard books on the subject. For instance, (pp. 11 and 12) a black line one twenty-thousandth part of an inch in width can be recognized as a line at ten inches distance. Further, if the line be broken, and one part displaced by the thickness of the line, the discontinuity can be recognized at a distance of ten inches, i.e., for reading vernier or a slide rule, accuracy up to 1″ may be expected, although for recognizing two adjacent lines of the same width the separation between them must subtend an angle of 100″ according to the author. We think that this is too great. We believe most people can recognize a displacement of 60″ at least, as a macular cone subtends an angle of less than 27″ at the nodal point of the eye, and all that is necessary is that a row of macular cones between the two retinal images should be unstimulated. The accuracy of the sense of alignment is of enormous importance to engineers and workers in a physical laboratory and is well known to be extraordinary; it almost certainly depends upon light sense and not upon the visual acuteness of the macula.

Atlas of the Histopathology of the Eye. By DR ADALBERT FUCHS. With 191 illustrations, contained in 44 coloured plates. Published in Leipzig and Vienna by Deuticke. 1924. Price 10 dollars.

This, the English translation of Dr. Fuchs' Atlas, contains eighty-five pages of text as a separate paper-covered book which has a place inside the cloth-covered board binding of the atlas. There is a three-page index and a five-page list of plates.

This atlas contains coloured illustrations of all the ordinary pathological conditions which are met with in ophthalmology. It contains several plates of each subject showing modifications. As an example of thoroughness, there are ten illustrations of various manifestations of sympathetic ophthalmia. Included in this series of sympathetic ophthalmia, there is one of what must be a very rare case of probable sympathetic ophthalmia in the first or injured eye before any appearance of sympathetic was seen in the second

eye. Another rare and interesting example of sympathetic ophthalmia is that in which the granulomatous mass has spread from the choroid along the track of posterior ciliary vessels through the sclera. These coloured illustrations of sympathetic ophthalmia are included in plates number 26 and number 27.

There are many examples of new growth of the various parts of the eye and, in addition to the more ordinary varieties, there is a good example of a melanoma or pigmented naevus of the choroid and a naevus of the conjunctiva, and, further, of an adenoma of the ciliary body. The use of this term "adenoma" is explained as referring to the appearance of the growth, which is somewhat glandular in form, although probably the growth is in no sense a truly glandular structure.

As examples of somewhat more uncommon pathological specimens there is one of disciform keratitis and one of keratomycosis aspergillina. It is to be noted that in the illustrations of phlyctenular and trachomatous pannus, the infiltration and vascularization are shown deep to Bowman's membrane, whereas in an example of degenerative pannus, this is superficial to Bowman's membrane.

It is perhaps rather unfortunate that the translation of what is generally known in this country as phlyctenular keratitis, is a direct translation from the term denoting the condition in German, namely, keratitis eczematosa. The term "eczematous" has, of course, no real connection with this disease, which has nothing related to the conditions of the skin that pass by that name.

A very important and helpful feature of the work is that the histories of individual cases with clinical notes are included in the description of the pathological plates.

One small criticism may be passed on the "make-up" of the book, but it is a very small matter. The cloth band that holds the paper-covered book of the text could be well replaced by a large pocket, or a strap outside all, for it is difficult to insert the paper-covered text underneath the band.

Words sufficiently complimentary for the illustrations themselves, for the actual drawing, the colouring and the reproduction cannot be found. All are excellent. The paper on which the coloured illustrations are printed is very good. The text is in large type and is well spaced and the English translation appears to be satisfactory. This atlas, at the figure of 10 dollars, is certainly a marvellous production considering the fact that there are no fewer than 191 coloured illustrations.

CORRESPONDENCE

SOME HISTORICAL DATA ON PARINAUD'S CONJUNCTIVITIS

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY

SIR,—Lest some of your younger readers may assume that the bibliography appended to Pascheff's interesting article on Parinaud's conjunctivitis and its relation to Pascheff's bacillus infectiosa necroticans (*Brit. Jl. of Ophthal.*, January, 1924) has any pretensions to completeness it may be worth while to note that beside the ten articles mentioned, there must be at least fifty others on the subject. Parinaud's first description of the disease was published in 1886, but the first recognition of his work in any language but French was given by the undersigned in his article in the *Amer. Jl. of Ophthal.*, July, 1898. In this report of five cases the writer first proposed the name Parinaud's conjunctivitis on the ground that the postulate implied in Parinaud's designation (Infectious Conjunctivitis of Animal Origin) was entirely unproved. The resemblance of this disease to some cases of tuberculosis of the conjunctiva was pointed out; as well as the occasional occurrence of giant-cells in the granulations. I mention the giant cells because Pascheff, apparently following Morax, says they do not occur in Parinaud's. Pascheff also quotes Morax to the effect that the epithelium is normal and unbroken in Parinaud's. On the contrary, Parinaud himself described conjunctival ulceration as a common symptom and it was present in all but one of my first five cases, as well as in nearly all of the ten or twelve cases which I have seen since 1898. This by way of indicating that the line of demarcation between Pascheff's conjunctivitis necroticans infectiosa and Parinaud's conjunctivitis is not so sharp as he seems to think. That a case with the Parinaud syndrome may be caused by one of several different germs seems highly probable; and it seems certain that among these germs the bacillus of Pascheff must take an important rank. Historically it is of interest that the first report of this syndrome probably was that of Goldziehr who under the name *Lymphadenitis Conjunctivae* (*Centralbl. f. Aug.*, p. 321, 1882) described a case four years before Parinaud's article appeared.

H. GIFFORD.

OMAHA.

OBITUARY NOTICE

GEORGE HENRY OLIVER, M.R.C.S.

MR. OLIVER, whose death on April 14th was noted in our last number, was the eldest son of the late Thomas Oliver, of New Holland, Lincolnshire. Born in 1861, he was educated at the Leeds Medical School and in Vienna. He took the double qualification of an earlier day, namely, the M.R.C.S. and L.S.A. in 1885, and added the L.R.C.P. in 1888, while on the institution of the D.O. (Oxon), he was one of the first batch of candidates. Practically the whole of his professional life was passed in Bradford, where he was assistant surgeon and later consulting surgeon to the Bradford Royal Eye and Ear Hospital. During the war he was surgeon to the Bradford War Hospital, and O/C No. 84 Ophthalmic Centre, War Hospital, Bradford. He had been appointed vice-president of the Section of Ophthalmology at the meeting of the British Medical Association which will be held at Bradford in July next. His other appointments included the presidency of the Bradford Medico-Chirurgical Society, that of president of the North of England Ophthalmological Society, and that of chairman of the local Division of the British Medical Association.

Mr. Oliver had many interests outside his profession, he was a skilful pianist; from boyhood he had been keenly interested in natural history, he was a medallist in botany in his student days at Leeds and was recognised as an authority on spiders.

NOTES

Death

DR. JOSÉ A. BARRAQUER, of Barcelona, the father of Dr. Ignacius Barraquer of that city, died on April 25th, at the age of 72 years. In early life he was well known as an anatomist; he studied ophthalmology in Paris, chiefly under Abadie and Galezowski and practised all his life at Barcelona.

* * * * *

Appointments

DR. H. M. TRAQUAIR has been appointed Ophthalmologist to Chalmers' Hospital, Edinburgh.

The following appointments at St. Thomas's Hospital have recently been made:

Consulting Ophthalmic Surgeon, Mr. J. HERBERT FISHER; Ophthalmic Surgeon, Mr. A. C. HUDSON; Ophthalmic Surgeon in charge of Out-Patients, Mr. P. G. DOYNE.

* * * * *

Errata

IN Professor Holth's paper on "An Arabic Needle from Antiquity" in the June number, page 266, six lines from the foot of the page, the name Ἀδηάκαβος should read Ἀθηακαβος

FUTURE ARRANGEMENTS

July 2-5.—Oxford Ophthalmological Congress.

The Doyne Memorial Lecture will be delivered by Dr. T. Harrison Butler on "Focal illumination of the eye, with special reference to the clinical use of Gullstrand's Slit-Lamp." A Discussion will be held on "The general principles of the treatment of convergent concomitant strabismus" (excluding details of operations) to be opened by Dr. E. Landolt of Paris and Dr. Ernest Thomson of Stirling. A discussion on "Medico-legal Ophthalmology" will also be held.

July 22-25.—British Medical Association. Ninety-Second Annual Meeting at Bradford. Section of Ophthalmology. President: A. Maitland Ramsay, M.D.; Vice-Presidents: R. J. Coulter, M.B., A. L. Whitehead, M.B.; Hon. Secretaries: J. D. McCulloch, M.B., Humphrey Neame.

September 1-6.—Course on the slit-lamp at the Ophthalmic Clinic of Zürich.

In answer to a number of applicants who could not be accommodated last year, Professor Vogt will hold a course in slit-lamp work, combined with demonstrations of the fundus in red-free light, from September 1 to 6, inclusive, 1924. The programme will be the same as that of last year. The number of students to be admitted to the course is limited.

Application should be made to Professor Vogt, Universitäts Augenklinik, Zürich.

October 7.—Midland Ophthalmological Society (Annual Meeting) at the Birmingham and Midland Eye Hospital.